SUBJECT INDEX.

[References to the papers read before the Institute are indicated by the word *Paper* following the page number. The letter *P.* denotes a reference in Section I. of the Journal which contains the reports of the proceedings of meetings, the papers read, and the discussions thereon. The letter *A.* denotes a reference to the section dealing with abstracts.

Indexing of Alloy Steels and Other Alloys. In the indexing of alloy steels, carbon and iron are ignored and the alloying elements contained in the steel are arranged in alphabetical order; for example, all references to nickel-chromium-molybdenum steel will be found under the heading chromium-molybdenum-nickel steel. In the indexing of other alloys, carbon and iron, when present, are included in the title; iron, when present, is always mentioned first and the other elements follow in alphabetical order, carbon being in all cases mentioned last. Examples: "Iron-silicon-carbon alloys" and "iron-chromium-nickel-carbon alloys."]

ABRASION. *See* Wear.
ABRASIVE DISCS, use for cutting metals, 112*A*.
ABSORPTIOMETER, Spekker Photo-Electric, use in analysis, 227*A*.
ACETIC ACID, corrosion of metals, 226*A*.
ACID BESSEMER STEEL, dephosphorisation, 50*A*.
ACID OPEN-HEARTH FURNACES, refractory materials for, 162*A*.
ACID OPEN-HEARTH PRACTICE, 104*A*., 204*A*.
  carbon control, 206*A*.
  slag control, 206*A*.
  use of light scrap, 206*A*.
ACID OPEN-HEARTH STEEL, gases in, 206*A*.
ACID-RESISTANT IRON, manufacture, 133*A*.
ACIDS:
  corrosion of alloys, 125*A*.
  corrosion of iron, effect of electric current, 226*A*.
  corrosion of steel, 191*A*.
ACOUSTIC TESTS, 67*A*.
AGDE-DAMM TEST, for coking coal, 44*A*.
AIR, compressed, use in hydraulic plants at Bessemer works, 57*A*.
AIR CONDITIONING. *See* Blast, drying.
AIR HEATERS, use at blast-furnaces, 133*A*.
AIRCRAFT CONSTRUCTION:
  use of castings, 49*A*.
  use of drop forgings, 58*A*.
  use of low-alloy steel, 74*A*., 221*A*.
  use of stainless steel, 74*A*.
  use of steel, 74*A*.
AIRCRAFT PARTS, heat-treatment furnaces, 173*A*.
AIRCRAFT STEEL, specifications, American, 34*A*.
ALGOMA STEEL CORPORATION, LTD.:
  boiler plant, 3*A*.
  lining of basic furnaces, 42*A*.
  plant, 11*A*.
ALLOYS:
  aluminium, damping capacity, 70*A*.
  copper, corrosion in soils, 126*A*.
  copper-zinc, damping capacity, 70*A*.
  corrosion, mechanism, 125*A*.
  determination of titanium, mercury cathode method, 82*A*.
  iron, solubility of hydrogen, 181 *Paper*.
  iron-aluminium-cobalt-nickel, use for magnets, 148*A*.
  iron-aluminium-nickel, effect of heat treatment, 78*A*., 224*A*.
  iron-aluminium-nickel, sintered, use for magnets, 46*A*.
  iron-carbon, absorption of nitrogen, 30*A*.
  iron-chromium, absorption of nitrogen, 30*A*.
  iron-cobalt, corrosion, 125*A*.
  iron-columbium, precipitation hardening and creep strength, 72*A*.
  iron-manganese, corrosion, 125*A*.
  iron-nickel, corrosion, 125*A*.
  iron-nickel, damping capacity, 70*A*.
  iron-nickel, solubility of hydrogen, 181*P*.
  iron-phosphorus, absorption of nitrogen, 30*A*.

ALLOYS (*contd.*)—
iron-silicon, acid-resistant, manufacture, 133*A*.
magnesium, damping capacity, 70*A*.
non-ferrous, corrosion, 125*A*.
ALNICO, use for magnets, 148*A*.
ALUMETISING, 182*A*.
ALUMINA :
effect on carbon monoxide, decomposition, 3*A*.
effect on iron oxide at high temperatures, 199*A*.
ALUMINIUM :
addition to killed steel, 206*A*.
anodic coatings, 114*A*.
consumption in American steel industry, 53*A*.
effect in free-cutting steel, machinability, 148*A*.
effect in galvanising bath on coatings, 181*A*.
oxide coatings, 114*A*.
ALUMINIUM ALLOYS, damping capacity, 70*A*.
ALUMINIUM COATINGS, effect on cast iron, growth and scaling, 182*A*.
AMMONIUM CHLORIDE, corrosion of alloys, 125*A*.
ANALYSIS, 80*A*., 157*A*., 227*A*.
electrographic, 157*A*.
gases in liquid steel, 80*A*.
iron ore, Moore's electrolytic method, 157*A*.
pig iron, 82*A*.
spectrum, determination of copper and tin, 205*A*.
spectrum, inclusions, 81*A*.
spectrum, instruments used in, 152*A*.
spectrum, iron and steel, 81*A*.
use of drop reactions, 157*A*.
ANCHORS, moulding, 202*A*.
ANNEALING :
bright, steel, 64*A*.
effect on transformer steel, 120*A*.
ANNEALING FURNACES, for stainless-steel strip, 18*A*.
ANODIC COATINGS, on aluminium, 114*A*.
ANTIMONY, effect in galvanising bath on coatings, 181*A*.
ARC FURNACES. *See* Electric Furnaces.
ARKANSAS, manganese ore deposits, 87*A*.
ARMAMENTS, steel specifications, 185*A*.
ASH, determination in coal, 158*A*.
ASSOCIATES, election, 4*P*.
ATLANTIC STEEL CO., plant, 169*A*.
ATMOSPHERES :
controlled, 61*A*., 107*A*., 173*A*. 211*A*.
industrial, determination of extent of pollution, 164*A*.
ATRAMENT PROCESS, 179*A*.
AUSTENITE :
decomposition products, lattice relationships, 223*A*.
solubility of graphite, 186*A*.
transformation in cast iron, effect of elements, 186*A*.
transformation in high-speed steel, 76*A*.
AUSTENITIC STEEL, machinability, effect of elements, 148*A*.
AUSTRALIA :
open-hearth practice, 206*A*.
production of ferro-alloys, 95*A*.
production of tungsten steel, 95*A*.
AUTO SPECIALITIES MANUFACTURING CO., plant, 100*A*.
AUTOMOBILE CONSTRUCTION, use of cast iron, 117*A*.
AUTUMN MEETING, proceedings, 1*P*.
AXLES, fatigue cracks, detection, 183*A*.

BAINITE, lattice relationship to austenite, 223*A*.
BAKELITE, damping capacity, 70*A*.
BARRETT EFFECT, 70*A*.
BARS, drawing, use of carbide dies, 13*A*.
BASIC BESSEMER PLANTS, use of compressed air in hydraulic plants, 57*A*.
BASIC BESSEMER PROCESS :
control by measurement of flame radiation, 103*A*., 204*A*.
heat requirements, 52*A*.
BASIC OPEN-HEARTH FURNACES :
tilting, brick consumption, 16*P*.
tilting, linings, 9 *Paper*.
BASIC OPEN-HEARTH PRACTICE, 103*A*., 204*A*.
use of blown metal, 206*A*.
BASIC OPEN-HEARTH PROCESS :
heat requirements, 52*A*.
iron ores for, 204*A*.
slag control, 204*A*.
BEACON BENTONITE SUBSTITUTE, use in moulding sand, 436*P*.
BEARINGS, synthetic resin, 210*A*.
BENBOND, use in moulding sand, 430*P*.
BEND-FATIGUE TESTS, welded plates, 20*A*.

BEND TESTS :
notched-bar, 25*A*.
weld metal, 20*A*., 67*A*.
BENTONITE, use in moulding sand, 423*P*.
BERYLLIUM OXIDE, effect on iron oxides at high temperatures, 199*A*.
BESSEMER CONVERTERS, pin distribution in bottoms, 50*A*., 203*A*.
BESSEMER PLANTS :
basic, use of compressed air in hydraulic plants, 57*A*.
lay-out, 169*A*.
BESSEMER PROCESS :
basic, control by measurement of flame radiation, 103*A*., 204*A*.
basic, heat requirements, 52*A*.
effect of after-blow, 203*A*.
BESSEMER STEEL :
acid, dephosphorisation, 50*A*.
effect of phosphorus, 122*A*.
BIBLIOGRAPHY, 84*A*., 159*A*., 230*A*.
microbiological deposits in water circulating systems, 189*A*.
BILLET MILLS, electric driving, 14*A*.
BILLETS :
deseaming, 22*A*., 176*A*.
reheating furnaces, 209*A*.
rolling, costs, 141*A*.
BISMUTH, effect in steel, machinability, 148*A*.
BLAST :
control in cupolas, 200*A*.
design of valves and mains, 198*A*.
drying, 7*A*., 166*A*.
effect of moisture and pre-heating on cast iron, 97*A*.
use of air-heaters, 133*A*.
BLAST-FURNACE COKE, properties, 44*A*.
BLAST-FURNACE FLUE DUST :
concentration, 166*A*.
recovery of iodine and potassium chloride, 199*A*.
sintering, 195*A*.
BLAST-FURNACE GAS :
calculation of carbon-monoxide, carbon dioxide and hydrogen contents, 45*A*.
cleaning, 6*A*.
use in conjunction with coke breeze for firing boilers, 163*A*.
use under boilers, 197*A*.
BLAST-FURNACE LININGS, wear, 162*A*.
BLAST-FURNACE PLANT :
Algoma Steel Corporation, Ltd., 11*A*.
Steel Company of Canada, Ltd., 137*A*.
BLAST-FURNACE PRACTICE :
Broken-Hill Proprietary Co., Ltd., 93*A*.
effect of coke properties, 7*A*.
United States, 2*A*.
BLAST-FURNACE SLAG :
air-cooled, specification, 167*A*.
"falling," 21 *Paper*.
foamed, properties and uses, 7*A*.
recovery of vanadium, "bottom-reaction" process, 45*A*.
uses, 94*A*.
BLAST-FURNACE SLAG CEMENT, 46*A*., 199*A*.
BLAST-FURNACES :
blast, drying, 7*A*., 166*A*.
blast, use of air-heaters, 133*A*.
blowing-out, 45*A*.
charging, 198*A*.
hearths, carbon blocks for, 162*A*.
refractory materials, 90*A*.
use of sinter, 94*A*., 195*A*.
BLISTERS, in enamel coatings on steel, 115*A*.
BLOOMS :
deseaming, 23*A*.
reheating furnaces, 209*A*.
B.M. ROLLING MILLS, LTD., plant, 142*A*.
BOILER PIPES, specification, British, 152*A*.
BOILER PLANT, Algoma Steel Corporation, Ltd., 3*A*.
BOILER PLATE, recrystallisation during hot-working, 68*A*.
BOILER STEEL :
intercrystalline cracking, 155*A*.
specification, British, 34*A*.
BOILER TUBES, pressure and creep tests, 28*A*.
BOILER WATER, microbiological deposits, 189*A*.
BOILERS :
use of blast-furnace gas, 197*A*.
use of blast-furnace gas and coke breeze, 163*A*.
waste-heat, 4*A*.
BOLTS :
corrosion in soils, 126*A*.
heat treatment, 18*A*.
BOMBS :
heat-treatment furnaces, 18*A*.
moulding, 136*A*.
BOOK NOTICES :
Institute of Engineers, Australia, "Australian Standard Engineering Drawing Practice," 84*A*.
Low, "Engineering Mechanics," 228*A*.

BOOK NOTICES (*contd.*)—
Low, "Pocket Book for Mechanical Engineers," 229*A*.
Manley, "Fundamentals of Vibration Study," 193*A*.
Meyenberg, "Economic Control of Iron and Steel Works," 39*A*.
Pigott, "Chemical Analysis of Ferrous Alloys," 128*A*.
Rolfe, "Steels for the User," 2nd ed., 229*A*.
Sisco, "Modern Metallurgy for Engineers," 130*A*.
Society of Chemical Industry, "Reports on Progress of Applied Chemistry," Vol. XXVI, 230*A*.
BORON, effect in steel and cast iron, 121*A*.
BOTTOM-REACTION PROCESS, for recovery of vanadium, 45*A*.
BRAKE DRUMS, cast iron, behaviour, 134*A*.
BRASS, corrosion in soils, 127*A*.
BRAZIL :
iron and steel plant, 11*A*.
production of ferro-alloys, 199*A*.
BRIDGES :
for handling ore, 2*A*.
welded, cracks in, 21*A*.
BRIQUETTING, iron ore, 206*A*.
BRITISH CAST IRON RESEARCH ASSOC., permeability test for moulding sand, 416*P*.
BRITISH IRON AND STEEL FEDERATION, work on fuel economy, 91*A*.
BRITISH STANDARD SWELLING TEST, for coal, 164*A*.
BRITISH STANDARD TEST CODE, for coke ovens, 92*A*.
BRITTLENESS :
chromium-molybdenum-nickel steel at high temperatures, 29*A*.
chromium-molybdenum steel at high temperatures, 29*A*.
chromium steel at high temperatures, 29*A*., 71*A*.
steel, effect of hydrogen, 30*A*.
structural steel, effect of elements, 32*A*.
BROEMEL STRIP MILL, 14*A*., 141*A*.
BROKEN HILL PROPRIETARY CO., LTD. :
blast-furnace practice, 93*A*.
coking practice, 93*A*.
BRONZE, damping capacity, 70*A*.
BRONZE-WELDING, cast iron, 175*A*.
BROWN SYSTEM, of fuel-rate control for furnaces, 206*A*.
"BRUCH," definition, 119*A*.
BUFFALO BOLT CO., pickling plant, 112*A*.
BULLET-PROOF STEEL, production, 171*A*.
BULLETS, armour-piercing, case-hardening, 107*A*.
BUREAU OF MINES—AMERICAN GAS ASSOCIATION TESTS, of coking coal, 918*A*.
BUSHES, manufacture from iron powder, 46*A*.
BY-PRODUCTS, recovery, 5*A*.

CADMIUM :
effect in galvanising bath on coatings, 181*A*.
electrodeposition, 113*A*.
CADMIUM COATINGS, on wrought iron, corrosion in soils, 126*A*.
CALCIUM, effect in high-sulphur iron, 37*A*.
CALCIUM - ALUMINIUM - MAGNESIUM SILICATES, quaternary system, 36*P*.
CALCIUM-ALUMINIUM SILICATES, ternary system, 43*P*.
CALCIUM SILICATES, desulphurising power, effect of manganese, 138*A*.
CALIFORNIA, tungsten ore deposits, 1*A*.
CALIFORNIAN CHROME ORE, plasticity, 205*A*
CANNON, cast iron, first produced in England, 131 *Paper*.
CAPILLARITY, in grain boundaries, effect on grain growth, 36*A*.
CARBIDE TOOLS, 22*A*.
CARBIDES, formation in chromium steel, 222*A*.
CARBON :
control, in acid open-hearth practice, 206*A*.
deposition in coke-oven roofs, 197*A*.
determination in iron and steel, 157*A*.
determination, use of Leco apparatus, 205*A*.
diffusion in rimming steel, 357 *Paper*.
effect in cast iron, 31*A*.
effect in cast iron, austenite transformation, 187*A*.
effect in cast iron, machinability, 148*A*.
effect in molybdenum steel, creep strength, 149*A*., 150*A*.

CARBON (*contd.*)—
effect in steel, hair-line crack formation, 229*P*.
effect in steel, machinability, 27*A*.
effect in structural steel, brittleness, 32*A*.
effect in vanadium steel, creep strength, 149*A*., 150*A*.
thermal conductivity, 90*A*.
CARBON BLOCKS. *See* Refractory materials.
CARBON DIOXIDE, calculation of amount in blast-furnace gas, 45*A*.
CARBON MONOXIDE :
calculation of amount in blast-furnace gas, 45*A*.
decomposition, catalytic effect of metals and oxides, 3*A*.
CARBON-OXYGEN EQUILIBRIUM in liquid iron, 205*A*.
CARBON STEEL :
creep strength, effect of temperature, 27*A*.
effect of tin, 141*P*.
electrolytic cleaning, 112*A*.
hardenability, 16*A*.
properties, 216*A*.
weldability tests, 20*A*.
CARBURISING, gaseous, 107*A*.
CARNEGIE-ILLINOIS STEEL CORP., strip mill, 15*A*.
CARNEGIE RESEARCH GRANT :
award to B. H. Mason, 2*P*.
award to H. J. Merchant, 2*P*.
CARNOTITE ORE, concentration, 194*A*.
CARTRIDGE CASES, steel, production, 58*A*.
CASE-HARDENED STEEL, wear tests, 147*A*.
CASE-HARDENING :
armour-piercing bullets, 107*A*.
chromium - manganese - molybdenum steel, 214*A*.
chromium-manganese steel, 19*A*.
chromium - manganese - vanadium steel, 214*A*.
gears, 62*A*.
low-carbon steel, 143*A*.
Nicarb process, 63*A*.
salt bath. *See* Heat Treatment.
CASE-HARDENING STEEL :
molybdenum-free, properties, 26*A*.
selection for gear manufacture, 16*A*.
CAST IRON :
addition of silicon briquettes, 201*A*.
alloy, elastic properties, 31*A*.
alloy additions, economical use, 134*A*.
CAST IRON (*contd.*)—
austenite transformation, effect of elements, 186*A*.
bronze-welding, 175*A*.
carbon saturation, 215*A*.
carbon saturation, effect of silicon, 122*A*.
chromium-nickel, thermal cracking, 135*A*.
corrosion, 225*A*.
corrosion in soil, 110*P*.
damping capacity, 70*A*.
decarburisation, R.K. process, 7*A*.
defects, 75*A*.
desulphurisation, soda ash method, 98*A*.
detection of alloying elements, 75*A*.
effect of boron, 121*A*.
effect of elements, 31*A*.
effect of hydrogen, 72*A*.
effect of manganese, 151*A*.
effect of moisture and preheating of blast, 97*A*.
effect of sulphur, 151*A*.
effect of thorium, 121*A*.
Emmel, properties, 31*A*.
enamel coatings, defects, 115*A*.
graphitisation, effect of silicon and nickel, 101*A*.
growth, effect of aluminium coatings, 182*A*.
high-duty, production, 48*A*.
high-duty, production in cupolas, 96*A*.
high-duty, thermal cracking, 135*A*.
inoculated, properties, 31*A*.
machinability, effect of elements, 148*A*.
malleable. *See* Malleable Cast Iron.
Maurer's diagram, 67*A*.
Meehanite, properties, 31*A*.
metallographic polishing, 124*A*.
molybdenum, thermal cracking, 135*A*.
molybdenum-nickel, production, 48*A*.
nickel, structure, 223*A*.
Ni-Tensile, properties, 31*A*.
nitrided, use for tools, 173*A*.
scaling, effect of aluminium coatings, 182*A*.
undercooling, 102*A*.
use for automobile construction, 117*A*.
use for cylinder liners, 122*A*.
wear, 219*A*.
CAST IRON BOUNDARY POST, 95*A*.
CAST IRON CANNON, first produced in England, 131 *Paper*.

CASTING :
centrifugal, 10*A*.
centrifugal, guns, 49*A*.
CASTINGS :
chilled, graphitisation, 102*A*.
chromium steel, properties, 220*A*.
cleaning, 10*A*., 136*A*., 202*A*.
defects, 101*A*.
effect of molten metal conditions, 201*A*.
gating, 49*A*.
iron, large, moulding, 202*A*.
iron, substitution for steel castings, 167*A*.
malleable iron. *See* Malleable Iron Castings.
manganese steel, properties, 220*A*.
molybdenum steel, properties, 220*A*.
nickel steel, lowering of nickel content, 33*A*.
nickel steel, properties, 220*A*.
porosity, 49*A*.
silicon steel, properties, 220*A*.
steel, factors affecting surface, 207*A*.
steel, moulding sands for, 393 *Paper*.
steel, production, 98*A*., 135*A*.
steel, production in converters, 9*A*., 99*A*., 135*A*.
steel, production in rotary furnaces, 53 *Paper*.
steel, solidification, 203*A*.
steel, substitution of iron castings, 167*A*.
use in aircraft construction, 49*A*.
CATENARY HEAT-TREATMENT FURNACE, 18*A*.
CATHODIC PROTECTION, metals, 124*A*.
CAVITATION EROSION, resistance of metals to, 37*A*.
CEMENT, blast-furnace slag, 46*A*., 199*A*.
CEMENTATION, nitro-, 63*A*.
CEMENTITE, solubility curve, 186*A*.
CHAFING FATIGUE, 184*A*.
CHAIN-MAKING INDUSTRY, Staffordshire, 106*A*.
CHILLED CASTINGS, graphitisation, 102*A*.
CHILLED ROLLS, production, 201*A*.
CHILLED WHEELS, production, 167*A*.
CHLORIDE SOLUTIONS :
corrosion of iron, 226*A*.
corrosion of zinc, 226*A*.
CHROM-X, use in production of chromium steel, 56*A*.
CHROME-MAGNESITE BRICKS. *See* Refractory Materials.
CHROME ORE :
plasticity, 205*A*.
position in United States, 87*A*.
uses, 42*A*.
See also Refractory Materials.
CHROME ORE DEPOSITS :
Montana, 1*A*.
Oregon, 1*A*.
South America, 87*A*.
CHROMGUSS, properties, 123*A*.
CHROMIC OXIDE :
effect on carbon monoxide, decomposition, 3*A*.
effect on iron oxide at high temperatures, 199*A*.
CHROMITE. *See* Refractory Materials.
CHROMIUM, determination in iron and steel, 82*A*., 83*A*.
determination, use of photo-electric colorimeter, 205*A*.
effect in cast iron, 31*A*.
effect in cast iron, machinability, 148*A*.
effect in free-cutting steel, machinability, 148*A*.
electrodeposition, 24*A*., 113*A*.
electrodeposition, temperature control, 177*A*.
sponge, production, 131*A*.
CHROMIUM CARBIDE, effect in cast iron, austenite transformation, 187*A*.
CHROMIUM COATINGS :
on cylinder liners and crankshafts, 147*A*.
hard, 24*A*.
properties, 177*A*.
CHROMIUM - COBALT - MOLYBDENUM-NICKEL STEEL, heat treatment and welding, 151*A*.
CHROMIUM-COBALT-TUNGSTEN HIGH-SPEED STEEL, properties, 22*A*.
CHROMIUM - COLUMBIUM - NICKEL - TITANIUM STEEL, heat treatment and welding, 151*A*.
CHROMIUM-COPPER STEEL :
corrosion in soil, 110*P*.
weldability tests, 110*A*.
CHROMIUM - MANGANESE - MOLYB - DENUM STEEL, case-hardening, 214*A*.
CHROMIUM - MANGANESE - NICKEL STEEL, use for wrapping wire, 33*A*.
CHROMIUM-MANGANESE STEEL :
case-hardening, 19*A*.
heat treatment and welding, 151*A*.
scaling, effect of vanadium, 18*A*.
CHROMIUM - MANGANESE - VANADIUM STEEL, case-hardening, 214*A*.

CHROMIUM - MOLYBDENUM - NICKEL STEEL :
effect of tin, 141*P*.
embrittlement at high temperatures, 29*A*.
hair-line cracks, effect of carbon, 229*P*.
hardenability, 16*A*.
hardenability tests, 148*A*.
heat treatment, 65*A*.
heat treatment and welding, 151*A*.
CHROMIUM-MOLYBDENUM STEEL :
creep strength, effect of temperature, 27*A*.
effect of tin, 141*P*.
embrittlement at high temperatures, 29*A*.
nitriding, 63*A*.
use for rock drills, 73*A*.
weldability tests, 20*A*.
CHROMIUM - MOLYBDENUM - VANADIUM STEEL, properties at high temperatures, 30*A*.
CHROMIUM-NICKEL CAST IRON, thermal cracking, 135*A*.
CHROMIUM-NICKEL STEEL :
cast, properties, 123*A*.
corrosion, 126*A*.
corrosion in hydrochloric acid, 127*A*.
corrosion in nitric acid, 192*A*.
effect of nitrogen, 121*A*.
effect of tin, 141*P*.
heat treatment and welding, 151*A*.
production by duplex process, 54*A*.
properties at high temperatures, 220*A*.
quenching after tempering, 183*A*.
scaling, effect of vanadium, 18*A*.
substitutes for, 33*A*.
use in nitric acid plants, 151*A*.
welding, 144*A*., 145*A*.
welding, Shotweld process, 110*A*.
CHROMIUM-NICKEL STEEL SHEETS, properties, 146*A*.
CHROMIUM-SILICON STEEL, scaling, effect of vanadium, 18*A*.
CHROMIUM - SILICON - ZIRCONIUM STEEL, welding, 144*A*.
CHROMIUM STEEL :
carbide formation, 222*A*.
cast, properties, 123*A*.
corrosion in soil, 110*P*., 126*A*.
effect of nitrogen, 121*A*.
embrittlement at high temperatures, 29*A*., 71*A*.
pickling, 112*A*.
production, use of Chrom-X, 56*A*.
scaling, effect of vanadium, 18*A*.
CHROMIUM STEEL (*contd.*)—
use for magnets, 148*A*.
use in nitric acid plants, 151*A*.
welding, 111*A*., 144*A*.
CHROMIUM-STEEL CASTINGS, properties, 220*A*.
CHROMIUM - TUNGSTEN - VANADIUM HIGH-SPEED STEEL, properties, 22*A*.
CHROMIUM-VANADIUM HIGH-SPEED STEEL, effect of molybdenum and titanium, 31*A*.
CLAD STEEL :
copper, production, 113*A*.
copper-nickel, production, 113*A*.
stainless, production, 113*A*.
stainless, production, Jessop method, 113*A*.
CLAY, use in moulding sand, 428*P*.
CLAY SLURRY, addition to moulding sand, 136*A*.
CLAY SUBSTANCE, nature in moulding sand, 100*A*.
CLEANING :
blast-furnace gas, 6*A*.
castings, 10*A*., 136*A*., 202*A*.
coal, 5*A*.
electrolytic, 112*A*.
gases, electrostatic precipitation, 5*A*.
metals, 22*A*., 112*A*., 175*A*.
steel prior to painting, 23*A*.
COAL :
agglutinating-value test, 93*A*.
American, coking tests, 198*A*.
caking, 164*A*.
cleaning, 5*A*.
coking tests, Agde-Damm method, 44*A*.
coking tests, Davis Method, 44*A*.
coking tests, Gieseler method, 44*A*., 165*A*.
determination of ash, 158*A*.
determination of sulphur, 83*A*.
drying, Fleissner process, 197*A*.
Durham, coking properties, 4*A*.
Illinois, determination of fusain, 158*A*.
pulverised, use in reheating furnaces, 132*A*.
swelling, 164*A*., 165*A*.
swelling tests, British Standard method, 164*A*.
swelling tests, Gray-King method, 164*A*.
swelling tests, Lessing method, 164*A*.
COAL DEPOSITS :
Japan, 1*A*., 87*A*.
Korea, 1*A*.

Coal Deposits (*contd.*)—
Manchukuo, 1*A*.
Pennsylvania, 1*A*.
South America, 87*A*.
Coating, metals, 24*A*., 113*A*., 176*A*.
Coatings :
aluminium, effect on cast iron, growth and scaling, 182*A*.
anodic, on aluminium, 114*A*.
cadmium, on wrought iron, corrosion in soils, 126*A*.
chromium, hard, 24*A*.
chromium, properties, 177*A*.
copper, on iron and steel, 181*A*.
on cylinder liners and crankshafts, 147*A*.
enamel, on cast iron, defects, 115*A*.
enamel, defects, effect of hydrogen, 116*A*.
enamel on steel, blisters, 115*A*.
enamel, on steel, effect of oxide coatings, 116*A*.
nickel, thickness determination, 177*A*.
oxide, on aluminium, 114*A*.
oxide, iron and steel, 114*A*.
oxide, on magnesium, 114*A*.
oxide, protective value, 192*A*.
oxide, on steel, salt-spray test, 154*A*.
oxide, on zinc, 114*A*.
paint, on steel, 182*A*.
paint, substitute for zinc coatings, 117*A*.
phosphate, 177*A*., 178*A*., 179*A*.
phosphate, on condenser tubes, 179*A*.
phosphate, on piston rings, 180*A*.
phosphate, protective value, 192*A*., 224*A*.
phosphate, sprayed, 180*A*.
phosphate, on steel, 114*A*.
phosphate, on steel prior to cold-work, 180*A*.
protective, for underground protection, 39*A*., 126*A*.
protective, use of greases and oils, 188*A*.
zinc, corrosion, 226*A*.
zinc, electrolytic, corrosion, 190*A*.
zinc, electrolytic, protective value, 192*A*.
Cobalt :
damping capacity, 70*A*.
substitutes for, 185*A*.
Cobalt High-Speed Steel, properties, 22*A*.
Cohesive Strength, metals, 119*A*., 216*A*.
Coke :
blast-furnace, properties, 44*A*.
density and porosity, determination, 93*A*.
determination of sulphur, 83*A*.
low-temperature, use in producers, 196*A*.
properties, effect on blast-furnace operation, 7*A*.
Coke Breeze, use in conjunction with blast-furnace gas for firing boilers, 163*A*.
Coke-Oven Gas, use in open-hearth furnaces, 207*A*.
Coke-Oven Roofs, carbon deposition, 197*A*.
Coke-Oven Walls, temperature distribution, 92*A*.
Coke Ovens :
British standard test code, 92*A*.
Koppers-Becker, heating, 92*A*.
repair, 5*A*.
Coking Practice, 44*A*.
Broken-Hill Proprietary Co., Ltd., 93*A*.
effect of coking rate, 197*A*.
Coking Properties, Durham coal, 4*A*.
Coking Tests :
American coal, 198*A*.
coal, Agde-Damm method, 44*A*.
coal, Davis method, 44*A*.
coal, Gieseler method, 44*A*., 165*A*.
Colbond, use in moulding sand, 429*P*.
Cold Rolling :
cooling of rolls, 141*A*.
effect on transformer steel, 120*A*.
Cold Work :
effect on lattice expansion, 25*A*.
effect on steel, 26*A*.
Cold-Worked Manganese Steel, use for magnets, 27*A*., 149*A*.
Cold-Working, steel, pretreatment by phosphatising, 180*A*.
Colorado, tungsten ore deposits, 1*A*.
Colorimeter, photo-electric, use in analysis, 205*A*.
Colouring, metals, 113*A*., 182*A*.
Columbium :
effect in steel, machinability, 148*A*.
effect in structural steel, brittleness, 32*A*.
in South America, 87*A*.
Columbium Steel, creep strength, 72*A*.
Companhia Siderurgica Belgo-Mineira, plant, 11*A*.
Compressive Properties, stainless steel sheets, 146*A*.

CONCENTRATION :
carnotite ore, 194*A*.
flue dust, 166*A*.
iron ore, 2*A*.
lead ore, 89*A*.
manganese ore, 41*A*., 88*A*., 89*A*., 131*A*., 194*A*.
manganiferous iron ore, 88*A*.
mercury ore, 89*A*.
strontium ore, 89*A*.
titanium ore, 89*A*.
vanadium ore, 89*A*.
wad ore, 195*A*.
zinc, 89*A*.
CONDENSER TUBES, phosphate coating, 179*A*.
CONDENSING PLANT, corrosion, 189*A*.
CONDUCTIVITY :
thermal, carbon, 90*A*.
thermal, fibrous material, 90*A*.
thermal, granular material, 90*A*.
thermal, graphite, 91*A*.
thermal, insulating bricks, 90*A*.
thermal, mica, 90*A*.
thermal, moulding sand, 420*P*.
thermal, refractory materials, 90*A*.
CONTRACTION, malleable cast iron, 48*A*.
CONTROL INSTRUMENTS :
for rolling-mill plants, 16*A*.
for steel plants, 137*A*.
CONVERTERS :
compared with electric furnaces, 54*A*.
pin distribution in bottoms, 50*A*., 203*A*.
production of steel castings, 9*A*., 99*A*., 135*A*.
COPPER :
corrosion in soils, 126*A*., 127*A*.
determination in iron and steel, 158*A*.
determination, spectrographic method, 205*A*.
effect in cast iron, 31*A*.
effect in cast iron, machinability, 148*A*.
elastic properties, 119*A*.
electrodeposition, 113*A*.
spraying, 181*A*.
COPPER ALLOYS, corrosion in soils, 126*A*.
COPPER CLAD STEEL, production, 113*A*.
COPPER COATINGS, on iron and steel, 181*A*.
COPPER-MOLYBDENUM STEEL, corrosion in soils, 126*A*.
COPPER-NICKEL CLAD STEEL, production, 113*A*.
COPPER STEEL :
corrosion in soil. 110*P*.
forgeability, 150*A*.
weldability, 150*A*.
COPPER-ZINC ALLOYS, damping capacity, 70*A*.
COPPERWELD STEEL CO., plant, 203*A*.
CORE BINDERS :
economical use, 202*A*.
properties, 10*A*.
CORE BLOWERS, 101*A*.
CORE COMPOUNDS, 441*P*.
CORE-SAND MIXTURES, 441*P*.
preparation, 10*A*.
CORE SANDS, gas evolution, 446*P*.
CORROSION :
alloys, mechanism, 125*A*.
atmospheric, iron, 187*A*.
atmospheric, steel, 191*A*.
bolts in soils, 126*A*.
brass in soils, 127*A*.
cast iron, 225*A*.
cast iron in soils, 110*P*.
chromium-copper steel in soils, 110*P*.
chromium-nickel steel, 126*A*.
chromium-nickel steel in nitric acid, 192*A*.
chromium steel in soils, 110*P*., 126*A*.
copper and copper alloys in soils, 126*A*.
copper in soils, 127*A*.
copper-molybdenum steel in soils, 126*A*.
copper steel in soils, 110*P*.
galvanised steel in soils, 126*A*.
galvanised vessels, by pig food, 192*A*.
ingot iron in soils, 110*P*.
iron in acids, effect of electric current, 226*A*.
iron in chloride solutions, 226*A*.
iron-cobalt alloys, 125*A*.
iron-manganese alloys, 125*A*.
iron-nickel alloys, 125*A*.
iron and steel in soils, 107 *Paper*, 38*A*., 126*A*., 127*A*.
lead in soils, 127*A*.
malleable cast iron in soils, 126*A*.
metals in acetic acid, 226*A*.
non-ferrous alloys, 125*A*.
Ovifak iron, 225*A*.
pipes in soils, 39*A*.
prevention, use of greases and oils, 188*A*.
salt-bath containers, 226*A*.
sheets in soils, 39*A*.
stainless steel in hydrochloric acid, 127*A*.

CORROSION (*contd.*)—
stainless steel in soils, 127*A*.
steel in acids, 191*A*.
steel in hydrochloric acid, 191*A*.
steel in nitric acid, 191*A*.
steel in sea water, 191*A*.
steel in sulphuric acid, 191*A*.
steel in water, use of inhibitors and their effect on heat transfer, 73 *Paper*.
turbine blades, 38*A*.
water-circulating systems, microbiological deposits, 189*A*.
water circulating systems, effect of sulphur dioxide, 189*A*.
wrought iron, cadmium plated, in soils, 126*A*.
wrought iron in soils, 110*P*., 126*A*.
zinc in chloride solutions, 226*A*.
zinc in soils, 110*P*., 127*A*.
zinc coatings, 226*A*.
zinc coatings, electrolytic, 190*A*.
CORROSION MEASUREMENTS, null method, 127*A*.
CORROSION RESISTANCE, welded joints, 215*A*.
CORROSION STUDIES, use of statistical control, 155*A*.
CORROSION TESTING MACHINE, 224*A*.
CORROSION TESTS, atmospheric, 39*A*.
COSTS :
fuel, for reheating furnaces, 43*A*., 91*A*.
in iron industry, 47*A*.
open-hearth process, 51*A*.
open-hearth steel plants, 11*A*.
rolling of billets, 141*A*.
CRACKING :
intercrystalline, boiler steel, 155*A*.
thermal, cast iron brake drums, 135*A*.
CRACKS :
detection, Glo-Crack method, 217*A*.
detection, magnetic powder method, 218*A*.
fatigue, in axles, detection, 183*A*.
hair-line, formation, 193 *Paper*, 203 *Paper*.
hair-line, formation, effect of carbon, 229*P*.
hair-line, formation, effect of stresses, 251*P*., 253*P*.
hardness, in high-speed steel, 108*A*.
in gas cylinders, 37*A*.
in welded bridges, 21*A*.
CRANKSHAFTS :
cast iron compared with steel, 134*A*.
chromium plating, 147*A*.
fatigue strength, 184*A*.
forging, 13*A*.
CREEP :
mechanics, 149*A*.
steel, 149*A*.
CREEP STRENGTH :
columbium steel, 72*A*.
effect of temperature, 27*A*.
iron-columbium alloys, 72*A*.
molybdenum steel, effect of carbon, 149*A*., 150*A*.
vanadium steel, effect of carbon, 149*A*., 150*A*.
CREEP TESTS, boiler tubes, 28*A*.
CRITICAL POINTS, determination, 222*A*.
CRUCIBLES, graphite, life, 74*A*.
CRUSHER CASTINGS, moulding, 101*A*.
CRUSHING, iron ore, 89*A*.
CUBAN CHROME ORE, plasticity, 205*A*.
CUMMINGBOND, use in moulding sand, 437*P*.
CUPOLA PRACTICE, 8*A*., 47*A*., 96*A*., 167*A*., 200*A*.
CUPOLAS :
blast control, 200*A*.
effect of moisture and preheating blast on cast iron, 97*A*.
mixing and rotation of charges, 134*A*.
production of high-duty cast iron, 96*A*.
CUTTING :
oxy-acetylene, 21*A*., 66*A*.
use of abrasive discs, 112*A*.
CUTTING TOOLS, performance, 22*A*., 111*A*.
CYANIDE, determination in salt baths, 62*A*.
CYANIDING, dry, 63*A*.
CYLINDER COVERS, moulding, 168*A*.
CYLINDER LINERS :
chromium plating, 147*A*.
use of cast iron, 122*A*.
CYLINDERS :
gas, cracking, 37*A*.
gas, specification, British, 185*A*.
CZECHOSLOVAKIA, roasting of iron ore, 131*A*.

DAMPING CAPACITY :
aluminium alloys, 70*A*.
bakelite, 70*A*.
bronze, 70*A*.
cast iron, 70*A*.
cobalt, 70*A*.
copper-zinc alloys, 70*A*.
glass, 70*A*.
iron-nickel alloys, 70*A*.
ivorine, 70*A*.
ivory, 70*A*.

DAMPING CAPACITY (*contd.*)—
magnesium alloys, 70*A*.
monel metal, 70*A*.
nickel, 70*A*.
steel, 70*A*.
DAVIS TEST, for coking coal, 44*A*.
DEAD STEEL, 147*A*.
DECARBURISATION, iron, R.K. process, 7*A*.
DEEP DRAWING, stainless steel, 209*A*.
DEFECTS :
in cast iron, 75*A*.
in castings, 101*A*.
in enamel coatings on cast iron, 115*A*.
in enamel coatings on steel, effect of oxide coatings, 116*A*.
in rails and tyres, 69*A*.
in steel, 119*A*., 208*A*.
DEGREASING, metals, 176*A*.
DELAWARE, LACKAWANNA & WESTERN RAILROAD, forging plant, 58*A*.
DENSENERS, use for malleable iron castings, 48*A*., 49*A*.
DENSITOMETERS, 152*A*.
DENSITY, coke, determination, 93*A*.
DEOXIDATION, steel with titanium, 100*A*.
DEOXIDISERS :
effect on free cutting steel, machinability, 148*A*.
effect on steel, 219*A*.
DEPHOSPHORISATION, acid Bessemer steel, 50*A*.
DESEAMING :
billets, 22*A*., 176*A*.
ingots and blooms, 23*A*.
DESULPHURISATION :
cast iron, soda ash method, 98*A*.
pig iron, 94*A*.
pig iron, soda ash treatment, 133*A*.
steel, 52*A*.
steel, with calcium silicates, 138*A*.
steel in open-hearth process, 170*A*.
DEW-POINT, gas, determination, 132*A*.
DIE BLOCKS, heat treatment, 65*A*.
DIES :
carbide, use for drawing bars, 13*A*.
drawing, carbide, 141*A*.
drawing, contour, 141*A*.
drawing, use of wood, 106*A*.
forging, design, 140*A*., 172*A*.
forging, inserts for, 172*A*.
DIFFUSION, effect on transformation curves, 77*A*.
DISTRIBOND, use in moulding sand, 431*P*.
DOLOMITE. *See* Refractory Materials.
DOMINION FOUNDRIES AND STEEL, LTD., plant, 137*A*.
DOORS, water-cooled, for open-hearth furnaces, 104*A*.
DRAWABILITY, thin sheets, evaluation, 58*A*.
DRAWING :
bars, use of carbide dies, 13*A*.
deep, stainless steel, 209*A*.
shells, 140*A*.
wire, backward pull, 106*A*.
wire, formulæ for, 13*A*.
wire, heating up of metal, 172*A*.
wire, history, 13*A*.
DRAWING DIES :
carbide, 141*A*.
contour, 141*A*.
use of wood, 106*A*.
DRILLING, hardened parts, 22*A*.
DRILLS :
Hardsteel, 22*A*.
rock, use of chromium-molybdenum steel, 73*A*.
sharpening, 212*A*.
DROP FORGINGS, use in aircraft construction, 58*A*.
DROP HAMMERS, elimination of vibrations, 57*A*.
DROP REACTIONS, use in analysis, 157*A*.
DRYING :
blast, 7*A*., 166*A*.
coal, Fleissner process, 197*A*.
moulds, use of infra-red rays, 101*A*.
DUPLEX PROCESS :
development in America, 137*A*.
development in United States, 204*A*.
for production of chromium-nickel steel, 54*A*.
DURHAM COAL, coking properties, 4*A*.
DUST CATCHERS, for gas producers, 6*A*.
DYNAMO STEEL, effect of cold rolling and annealing, 120*A*.

ELASTIC CONSTANTS, polycrystalline iron, difference between those determined mechanically and by X-rays, 35*A*.
ELASTIC PROPERTIES :
alloy cast iron, 31*A*.
copper, 119*A*.
nickel, 119*A*.
open-hearth iron, 119*A*.
steel, 119*A*.
ELECTRIC AUTO-LITE CO., plant, 101*A*.

ELECTRIC CURRENTS :
effect on acid attack of iron, 226*A*.
use in heat treatment, 107*A*., 174*A*., 212*A*.
ELECTRIC DRIVING :
rolling mills, 14*A*.
rolling mills, use of d.c. system, 210*A*.
ELECTRIC FURNACES :
arc, 104*A*., 138*A*., 207*A*.
arc, for laboratory use, 151*A*.
arc, refractory materials for, 42*A*., 43*A*.
compared with converters, 54*A*.
high-frequency, 12*A*.
high-frequency, durability of basic linings, 55*A*.
high-frequency, magnesite linings for, 54*A*., 55*A*.
linings, rammed, 43*A*.
refractory materials for, 90*A*.
resistor, manufacture of steel, 11*A*.
rotating induction, for study of slag-metal equilibria, 104*A*.
slag-metal equilibria, 56*A*.
ELECTRICAL INSTRUMENTS, use in rolling-mill plants, 16*A*.
ELECTRICAL SHEETS, magnetostriction, 70*A*.
ELECTRIÇAL TESTS, 68*A*.
ELECTRODEPOSITION :
cadmium, 113*A*.
chromium, 24*A*., 113*A*.
chromium, temperature control, 177*A*.
copper, 113*A*.
gold, 113*A*.
lead, 24*A*.
manganese, 194*A*.
metals on stainless steel, 180*A*.
nickel, 24*A*., 113*A*.
nickel on irregular-shaped articles, 177*A*.
rhodium, 113*A*.
silver, 113*A*.
tin, 24*A*., 113*A*., 114*A*., 182*A*.
zinc, 113*A*.
ELECTRODES, welding, economical use, 174*A*.
ELECTROGRAPHIC METHOD of analysis, 157*A*.
ELECTROLYTIC CLEANING, 112*A*.
ELECTROLYTIC POLISHING, 34*A*.,186*A*.
ELECTROLYTIC TINNING, 114*A*., 182*A*.
ELECTRON MICROSCOPES, use of surface replicas of etched metals, 221*A*.
ELECTROSTATIC PRECIPITATION, gases, 5*A*.
ELINVAR, properties, 71*A*.
EMMEL IRON, properties, 31*A*.
ENAMEL, removal from sheets, 206*A*.
ENAMEL COATINGS :
on cast iron, defects, 115*A*.
defects, effect of hydrogen, 116*A*.
on steel, blisters, 115*A*.
on steel, effect of oxide coatings, 116*A*.
ENAMELLED SHEETS, removal of enamel, 206*A*.
ENGINE BED-PLATES, moulding, 49*A*.
ENGLAND, first cast iron cannon, 131 *Paper*.
ENTROPY, applications, 4*A*.
EQUILIBRIA, heterogeneous, symbols for, 153*A*.
EROSION :
cavitation, droplet impact tests, 155*A*.
cavitation, resistance of metals to, 37*A*.
cavitation, vibratory tests, 155*A*.
ETCHED METALS, use of surface replicas in microscopy, 221*A*.
ETCHING, deep, 75*A*.
EXCAVATING MACHINERY, for iron mines, 194*A*.
EXPANSION, thermal, moulding sand, 419*P*.

FACINGS, welded, properties, 20*A*.
FAILURE, gears, 147*A*.
FATIGUE, chafing, 184*A*.
FATIGUE CRACKS, in axles, detection, 183*A*.
FATIGUE DIAGRAMS, three dimensional, 217*A*.
FATIGUE STRENGTH :
calculation, 69*A*.
crankshafts, 184*A*.
effect of principal stresses, 184*A*.
steel at low temperatures, 218*A*.
welds, 146*A*.
welds, effect of notches, 21*A*.
FATIGUE TESTS, bend, welded plates, 20*A*.
FEEDERS, for malleable iron castings, 48*A*., 49*A*.
FERRIC - OXIDE/FERROSO - FERRIC - OXIDE SYSTEM, 166*A*.
FERRO-CHROMIUM :
production in Australia, 95*A*.
production in Brazil, 199*A*.
production in United States, 41*A*.
FERRO-MANGANESE :
production in Australia, 95*A*.
production in Brazil, 199*A*.

FERRO-SILICON :
production in Australia, 95*A*.
production in Brazil, 199*A*.
FERRO-TUNGSTEN :
production in Australia, 95*A*.
production in Brazil, 199*A*.
FIBROUS MATERIALS, thermal conductivity, 90*A*.
FILMS :
oxide, balance for studying, 225*A*.
oxide, on iron, 127*A*.
rate of formation on metals, 79*A*.
FIRE BRICKS. *See* Refractory Materials.
FLAKES, in steel, 53*A*.
FLEISSNER PROCESS, for drying coal, 197*A*.
FLOW, metal in forging, 13*A*.
FLUE DUST. *See* Blast-Furnace Flue Dust.
FLUX, welding, for high-sulphur steel, 215*A*.
FORGE FURNACES, 105*A*., 139*A*.
thermal efficiency, 209*A*.
FORGEABILITY :
copper steel, 150*A*.
metals, 140*A*.
FORGING :
crankshafts, 13*A*.
flow of metal, 13*A*.
shells, 140*A*.
shells, " one shot " method, 12*A*.
shells, Witter process, 13*A*.
tractor parts, 172*A*.
FORGING DIES :
design, 140*A*., 172*A*.
inserts for, 172*A*.
FORGING MACHINES, upset, 173*A*.
FORGING PRACTICE, 105*A*., 140*A*.
FORGING STEEL, deoxidisers, 219*A*.
FORGINGS :
drop, use in aircraft construction, 58*A*.
properties, 26*A*., 118*A*.
FOUNDRIES :
elimination of dust and noise, 136*A*., 137*A*.
mechanisation, 50*A*.
organisation, 47*A*.
steel, productive capacity, 202*A*.
FOUNDRY PATTERNS, use of paper, 101*A*.
FOUNDRY PLANT :
Auto Specialities Manufacturing Co., 100*A*.
Electric Auto-Lite Co., 101*A*.
Lynchburg Foundry Co., 134*A*.
Ruston and Hornsby, Ltd., 95*A*.
FOUNDRY PRACTICE, 8*A*., 47*A*., 95*A*., 134*A*., 167*A*., 200*A*.
FOUNDRY PRACTICE (*contd.*)—
increasing production, 99*A*.
steel, British, 98*A*.
FOX, SAMUEL & CO., LTD., plant, 203*A*.
FRACTURES, woody in steel, 35*A*.
FRANCE, iron and steel industry, 137*A*.
FREE-CUTTING STEEL :
machinability, effect of elements, 148*A*.
production, 51*A*., 170*A*.
rolling, 59*A*.
FUEL :
costs, for reheating furnaces, 43*A*., 91*A*.
low-grade, use in producers, 165*A*.
pulverised. *See* Coal, pulverised.
FUEL DEPARTMENT, organisation, 163*A*.
FUEL ECONOMY, in iron and steel industry, 91*A*., 163*A*.
FULBOND, use in moulding sand, 424*P*.
FULLERS' EARTH, use in moulding sand, 422*P*.
FURNACES :
blast. *See* Blast Furnaces.
electric. *See* Electric Furnaces.
forge. *See* Forge Furnaces.
heat transfer, 4*A*.
heat-treatment. *See* Heat-Treatment Furnaces, Annealing Furnaces, &c.
malleable iron. *See* Malleable Iron Furnaces.
metallurgical, mechanical stokers for, 43*A*.
open-hearth. *See* Open-Hearth Furnaces.
regenerative, fuel-rate control, Brown system, 206*A*.
reheating. *See* Reheating Furnaces and Soaking Pits.
rotary, linings, materials for, 63*P*., 67*P*.
rotary, linings, patching process, 66*P*.
rotary, production of steel castings, 53 *Paper*.
rotary, reduction of iron ore, 133*A*.
FUSAIN, determination in coal, 158*A*.

GALVANISED STEEL, corrosion in soils, 126*A*.
GALVANISED VESSELS, corrosion by pig food, 192*A*.
GALVANISING, 24*A*.

GALVANISING (*contd.*)—
effect of alloying elements in bath, 181*A*.
heat requirements, 114*A*.
welded joints, 181*A*.
GAS :
blast-furnace. *See* Blast-Furnace Gas.
cleaning, electrostatic precipitation, 5*A*.
coke-oven. *See* Coke-Oven Gas.
dew-point, determination, 132*A*.
flue, determination of sulphur dioxide, 83*A*.
long-distance, use in reheating furnaces, 105*A*.
GAS CYLINDERS :
cracking, 37*A*.
specification, British, 185*A*.
GAS PRODUCERS. *See* Producers.
GASES :
evolved from core sands, 446*P*.
in acid open-hearth steel, 206*A*.
in liquid steel, 52*A*.
in liquid steel, analysis, 80*A*.
GATING, castings, 49*A*.
GAUGES :
chromium plating, 147*A*.
for determining thickness, 16*A*.
pressure, 16*A*.
strain, 16*A*.
GEAR TEETH, quenching after tempering, 183*A*.
GEAR WHEELS, moulding, 168*A*.
GEARS :
case-hardening, 62*A*.
failure, 147*A*.
heat treatment, 173*A*.
manufacture from iron powder, 46*A*., 200*A*.
selection of case-hardening steels for, 16*A*.
GENERAL ELECTRIC CO., production of magnets, 148*A*.
GENERAL MOTORS CORPORATION, use of clay slurry in moulding sand, 136*A*.
GIESELER TEST, for coking coal, 44*A*., 165*A*.
GLASS, damping capacity, 70*A*.
GLO-CRACK METHOD, of detecting cracks, 217*A*.
GLOSSARY, terms used in powder metallurgy, 8*A*.
GOLD, electrodeposition, 113*A*.
GRAIN GROWTH, effect of capillarity in grain boundaries, 36*A*.
GRAIN SIZE, determination, 124*A*.
GRANULAR MATERIALS, thermal conductivity, 90*A*.
GRAPHITE :
amorphous, recarburisation of open-hearth steel, 52*A*.
solubility in austenite, 186*A*.
thermal conductivity, 91*A*.
GRAPHITISATION :
cast iron, effect of silicon and nickel, 101*A*.
chilled castings, 102*A*.
GRAY-KING TEST for coal, 164*A*.
GREASES, use for rust prevention, 188*A*.
GREAT LAKES STEEL CORP. :
fuel oil supply system, 206*A*.
sintering plant, 195*A*.
GREENAWALT SINTERING PLANT, at Julienhütte, 2*A*.
GROWTH, cast iron, effect of aluminium coatings, 182*A*.
GUILLEMIN EFFECT, 70*A*.
GUNS, centrifugal casting, 49*A*.

HAIR-LINE CRACKS :
formation, 193 *Paper*, 203 *Paper*.
formation, effect of carbon, 229*P*.
formation, effect of stresses, 251*P*., 253*P*.
HARDENABILITY :
carbon steel, 16*A*.
chromium - molybdenum - nickel steel, 16*A*.
steel, 69*A*., 219*A*.
HARDENABILITY TESTS :
chromium - molybdenum - nickel steel, 148*A*.
molybdenum steel, 148*A*.
HARDENED PARTS, drilling, 22*A*.
HARDENING :
flame, 143*A*., 213*A*.
flame, cylindrical surfaces, 213*A*.
flame, rails, 62*A*.
high-speed steel, 107*A*.
induction, 107*A*., 174*A*., 212*A*.
precipitation, iron-columbium alloys, 72*A*.
selective, 62*A*.
HARDNESS, weld metal, effect of composition, 175*A*.
HARDNESS CRACKS, in high-speed steel, 108*A*.
HARDNESS TESTS :
for determining tensile strength, 218*A*.
scatter in, 120*A*.
HARDSTEEL DRILLS, 22*A*.
HEAT :
consumption per ton of metallic charge in open-hearth practice, 51*A*.

HEAT (*contd.*)—
radiant, use for heat-treatment furnaces, 61*A*.
requirements of basic Bessemer and open-hearth processes, 52*A*.
requirements in galvanising, 114*A*.
HEAT BALANCES, ore sintering plants, 89*A*.
HEAT EXCHANGERS, corrosion, use of inhibitors and their effect on heat transfer, 73*P*.
HEAT-RESISTANT STEEL :
properties, 123*A*.
scaling, 17*A*., 63*A*.
HEAT TRANSFER :
effect of corrosion inhibitors, 73*P*.
furnaces, 4*A*.
HEAT TREATMENT, 16*A*., 61*A*., 106*A*., 143*A*., 173*A*., 211*A*.
bolts and nuts, 18*A*.
chromium - cobalt - molybdenum - nickel steel, 151*A*.
chromium - columbium - nickel - titanium steel, 151*A*.
chromium-manganese steel, 151*A*.
chromium - molybdenum - nickel steel, 65*A*., 151*A*.
chromium-nickel steel, 151*A*.
die blocks, 65*A*.
effect on iron-aluminium-nickel alloys, 78*A*., 224*A*.
effect on steel, 117*A*.
gears, 173*A*.
high-speed steel, 143*A*.
lifting jacks, 173*A*.
molybdenum high-speed steel, 16*A*.
pump parts, 108*A*.
shells, 107*A*.
tool steel, 212*A*.
use of electric currents, 107*A*., 174*A*., 212*A*.
use of salt baths, 17*A*., 143*A*., 173*A*., 212*A*.
use of salt baths, cyanide determination, 62*A*.
use of salt baths, position and shape of electrodes, 107*A*.
wire, 62*A*.
HEAT-TREATMENT FURNACES :
for aircraft parts, 173*A*.
for bombs, 18*A*.
Catenary type, 18*A*.
controlled atmospheres, 61*A*., 107*A*., 173*A*., 211*A*.
electric, 18*A*., 61*A*., 106*A*.
gas-fired, 106*A*.
radiant heat, 61*A*.
HEMATITE-MAGNETITE SYSTEM, 166*A*.
HIGH-FREQUENCY FURNACES. *See* Electric Furnaces.
HIGH-SPEED STEEL :
austenite transformation, 76*A*.
chromium-vanadium, effect of molybdenum and titanium, 31*A*.
hardening, 107*A*.
hardness cracks, 108*A*.
heat treatment, 143*A*.
molybdenum, heat treatment, 16*A*.
molybdenum, properties, 73*A*., 122*A*.
nitriding, 63*A*.
properties, 22*A*.
quenching, 76*A*.
HIGH-SPEED STEEL INGOTS, heterogeneity, 207*A*.
HIGH-SPEED STEEL TIPS, fixed to carbon steel shanks, 111*A*., 145*A*.
HISTORY :
cast iron cannon in England, 131 *Paper*.
slitting mills, 15*A*.
wire drawing, 13*A*.
HYDRAULIC PLANTS :
use of compressed air in, at Bessemer works, 57*A*.
use in steelworks, 57*A*.
HYDROCHLORIC ACID :
corrosion of alloys, 125*A*.
corrosion of steel, 191*A*.
effect on stainless steel, corrosion-resistance, 127*A*.
HYDROGEN :
calculation of amount in blast-furnace gas, 45*A*.
effect in cast iron, 72*A*.
effect in enamel coatings, 116*A*.
effect in malleable cast iron, annealing time, 167*A*.
effect in steel, 72*A*.
effect in steel, brittleness, 30*A*.
effect in steel, hair-line crack formation, 193*P*., 203*P*.
evolution from steel, 205*P*.
in liquid steel, 52*A*.
reduction of iron ore, 200*A*.
solubility in iron and iron alloys, 181 *Paper*.
solubility in iron-nickel alloys, 181*P*.
solubility in nickel steel, 181*P*.

IDAHO, tungsten ore deposits, 87*A*.
IGNITION RECTIFIERS, for rolling-mill motors, 141*A*.
ILLINOIS COAL, determination of fusain, 158*A*.
IMPACT STRENGTH, spot welds, 65*A*.

INCLUSIONS, spectrum analysis, 81*A*.
INFRA-RED RAYS, use for drying moulds, 101*A*.
INGOT IRON, corrosion in soil, 110*P*.
INGOT MOULDS :
cast iron stools for, 56*A*., 206*A*.
stools for, 207*A*.
for tool steel, 56*A*.
washes for, 207*A*.
INGOTS :
deseaming, 23*A*.
high-speed steel, heterogeneity, 207*A*.
rimming steel, Bessemer, manufacture and composition, 295 *Paper*, 327 *Paper*.
rimming steel, open-hearth, composition variation from outside to centre, 345 *Paper*.
rimming steel, open-hearth, manufacture and composition, 283 *Paper*.
sound, production, 56*A*.
INHIBITORS, effect on corrosion and heat transfer in heat exchangers, 73*P*.
INOCULATED IRON, properties, 31*A*.
INSULATING BRICKS, thermal conductivity, 90*A*.
INTENSIFYING SCREENS for radiographs, 76*A*.
INTERMETALLIC PHASES, linking, 153*A*.
INTERNATIONAL HARVESTER CO., forging plant, 172*A*.
IODINE, recovery from flue dust, 199*A*.
IRON :
corrosion in acids, effect of electric currents, 226*A*.
corrosion, atmospheric, 187*A*.
corrosion in chloride solutions, 226*A*.
crystal structure, 157*P*.
determination, Moore's electrolytic method, 157*A*.
effect in galvanising bath on coatings, 181*A*.
high-sulphur, effect of calcium, 37*A*.
liquid, absorption of nitrogen, 30*A*.
liquid, carbon-oxygen equilibrium, 205*A*.
open-hearth, elastic properties, 119*A*.
oxide films, 127*A*.
passive, activation in nitric acid, 190*A*.
polycrystalline, elastic constants, difference between those determined mechanically and by X-rays, 35*A*.
IRON (*contd.*)—
production, 7*A*., 45*A*., 94*A*., 133*A*., 166*A*., 198*A*.
pure, properties, 183*A*.
reaction with steam, 225*A*.
silicon, magnetisation near boundaries, 120*A*.
solubility of hydrogen, 181 *Paper*.
IRON ALLOYS, solubility of hydrogen, 181 *Paper*.
IRON - ALUMINIUM - COBALT - NICKEL ALLOYS, use for magnets, 148*A*.
IRON-ALUMINIUM-NICKEL ALLOYS :
effect of heat treatment, 78*A*., 224*A*.
sintered, use for magnets, 46*A*.
IRON-ALUMINIUM-NICKEL DIAGRAM, 77*A*.
IRON/CALCIUM-SULPHIDE SYSTEM, 36*A*.
IRON CARBIDE, isolation, electrolytic method, 35*A*., 222*A*.
IRON-CARBON ALLOYS, absorption of nitrogen, 30*A*.
IRON-CHROMIUM ALLOYS, absorption of nitrogen, 30*A*.
IRON COBALT ALLOYS, corrosion, 125*A*.
IRON-COLUMBIUM ALLOYS, precipitation hardening and creep strength, 72*A*.
IRON INDUSTRY :
French, 137*A*.
Japan, 46*A*.
IRON/IRON-SULPHIDE/CALCIUM-SULPHIDE SYSTEM, 36*A*.
IRON-MANGANESE ALLOYS, corrosion, 125*A*.
IRON MINES, excavating machinery, 194*A*.
IRON-NICKEL ALLOYS :
corrosion, 125*A*.
damping capacity, 70*A*.
solubility of hydrogen, 181*P*.
IRON ORE :
analysis, Moore's electrolytic method, 157*A*.
for basic open-hearth process, 204*A*.
briquetting, 206*A*.
concentration, 2*A*.
crushing, 89*A*.
determination of phosphorus, 158*A*.
low-grade, preparation, 89*A*.
manganiferous, concentration, 88*A*.
manganiferous, leaching, 194*A*.
microstructure, radiographic method of study, 76*A*.
Minette, sintering, 195*A*.
Minette, smelting, 195*A*.

IRON ORE (*contd.*)—
mining in Lincolnshire, 194*A*.
mining in Minnesota, 194*A*.
mixing, 89*A*.
reduction with hydrogen, 200*A*.
reduction in rotary furnaces, 133*A*.
roasting in Czechoslovakia, 131*A*.
roasting in Poland, 131*A*.
sintering, 2*A*., 195*A*., 206*A*.
sintering plants, heat balances, 89*A*.
IRON ORE DEPOSITS :
Japan, 1*A*., 87*A*.
Korea, 1*A*.
South America, 87*A*.
IRON-ORE INDUSTRY, United States, 2*A*.
IRON-ORE RESOURCES, Manchukuo, 1*A*.
IRON OXIDE :
effect on carbon monoxide, decomposition, 3*A*.
effect on methane, decomposition, 3*A*.
effect of other oxides at high temperatures, 198*A*.
IRON-OXYGEN SYSTEM, 159*P*.
IRON-PHOSPHORUS ALLOYS, absorption of nitrogen, 30*A*.
IRON POWDERS. *See* Powdered Iron.
IRON-SILICON ALLOYS, acid-resistant, manufacture, 133*A*.
IRON-ZINC COUPLES, potential changes, 38*A*.
IVORINE, damping capacity, 70*A*.
IVORY, damping capacity, 70*A*.

JACKS, lifting, heat treatment, 173*A*.
JAPAN :
iron industry, 46*A*.
iron and steel production, 1*A*., 88*A*.
mineral resources, 1*A*., 87*A*.
JESSOP METHOD for production of clad steel, 113*A*.
JONES AND LAUGHLIN STEEL CORP., drying of blast, 166*A*.
JOULE EFFECT, 70*A*.
JULIENHÜTTE, Greenawalt sintering plant, 2*A*.

KOPPERS-BECKER COKE OVEN, heating, 92*A*.
KOREA, mineral resources, 1*A*., 88*A*.
KRUPP-RENN PROCESS, 200*A*.

LABORATORIES, arc furnaces for, 151*A*.
LADLES :
drying and preheating, 47*A*.
nozzle-cap, bricks for, 205*A*.
two-nozzle, 207*A*.
LALANCE & GROSJEAN MFG. CO., plant, 209*A*.
LATTICE DISTORTION, X-ray investigation, 152*A*.
LATTICE RELATIONSHIP, austenite decomposition products, 223*A*.
LEACHING :
manganese ore, 41*A*.
manganiferous iron ore, 194*A*.
LEAD :
corrosion in soils, 127*A*.
effect in galvanising bath on coatings, 181*A*.
electrodeposition, 24*A*.
LEAD ORE, concentration, 89*A*.
LECO APPARATUS, use in analysis, 205*A*.
LESSING TEST, for coal, 164*A*.
LEVELLING MACHINES for sheets and strip, 59*A*.
LIME, burnt, effect on carbon monoxide, decomposition, 3*A*.
LIME-ALUMINA-SILICA SYSTEM, 33*P*.
LIME-SILICA-MAGNESIA SYSTEM, 35*P*.
LINCOLNSHIRE, iron-ore mining, 194*A*.
LININGS :
basic open-hearth tilting furnaces, 9 *Paper*.
blast-furnace, wear, 162*A*.
electric furnace, ramming, 43*A*.
Sesci furnaces, materials for, 63*P*., 67*P*.
Sesci furnaces, patching process, 66*P*.
LUBRICANTS :
filtration and reclamation, 210*A*.
high load-carrying capacity, 210*A*.
LUBRICATION, strip mills, 14*A*.
LYNCHBURG FOUNDRY CO., plant, 134*A*.

MACHINABILITY :
cast iron, effect of elements, 148*A*.
free-cutting steel, effect of elements, 148*A*.
malleable cast iron, 148*A*.
steel, effect of elements, 27*A*., 148*A*.
MACHINING, metals, 22*A*., 111*A*.
MACROGRAPHIC EXAMINATION, metals, 34*A*.
MAGNESIA-SILICA SYSTEM, 196*A*.
MAGNESITE. *See* Refractory Materials.

MAGNESIUM, oxide coatings, 114*A*.
MAGNESIUM ALLOYS, damping capacity, 70*A*.
MAGNESIUM CHROMATE, use as corrosion inhibitor, 73*P*.
MAGNETIC POWDER METHOD of detecting cracks, 218*A*.
MAGNETIC TESTS, 68*A*.
MAGNETISATION, metals near boundaries, 120*A*.
MAGNETITE, crystal structure, 157*P*.
MAGNETOSTRICTION, silicon steel, 70*A*.
MAGNETOSTRICTION PHENOMENA, 70*A*.
MAGNETS :
  permanent, production, 148*A*.
  production from sintered iron-aluminium-nickel alloys, 46*A*.
  use of cold-worked manganese steel, 27*A*., 149*A*.
MAGNITOGORSK WORKS, blowing-out of blast-furnace, 45*A*.
MAGNO, 179*A*.
MAINS, hot-blast, design, 198*A*.
MALLEABLE CAST IRON :
  annealing time, effect of hydrogen, 167*A*.
  behaviour in molten zinc, 181*A*.
  corrosion in soils, 126*A*.
  machinability, 148*A*.
  short-time annealing, 98*A*.
  shrinkage and contraction, 48*A*.
MALLEABLE IRON CASTINGS :
  feeders for, 48*A*., 49*A*.
  production, 49*A*.
  use of denseners, 48*A*., 49*A*.
MALLEABLE IRON FURNACES, refractory materials for, 90*A*.
MANCHUKUO, mineral resources, 1*A*., 88*A*.
MANGANESE :
  determination in iron and steel, 82*A*., 157*A*.
  determination in pig iron, 82*A*.
  effect on calcium silicates, desulphurising power, 138*A*.
  effect in cast iron, 151*A*.
  effect in cast iron, austenite transformation, 187*A*.
  effect in cast iron, machinability, 148*A*.
  effect in free-cutting steel, machinability, 148*A*.
  effect in steel, machinability, 27*A*., 148*A*.
  effect in structural steel, brittleness, 32*A*.
  electrodeposition, 194*A*.
  recovery, nitrogen dioxide process, 88*A*.
MANGANESE-MOLYBDENUM STEEL, effect of tin, 141*P*.
MANGANESE ORE :
  concentration, 41*A*., 88*A*., 89*A*., 131*A*., 194*A*.
  leaching, 41*A*.
  nodulising, 88*A*.
  sintering, 88*A*.
MANGANESE ORE DEPOSITS :
  Arkansas, 87*A*.
  Japan, 1*A*.
  Korea, 1*A*.
  Manchukuo, 1*A*.
  Montana, 1*A*.
  New Mexico, 1*A*.
  South America, 87*A*.
  United States, 1*A*.
MANGANESE STEEL :
  cold-worked, use for magnets, 27*A*., 149*A*.
  weldability tests, 20*A*.
MANGANESE-STEEL CASTINGS, properties, 220*A*.
MANGANESE-STEEL GAS CYLINDERS, specification, British, 185*A*.
MANGANESE-VANADIUM STEEL, production, 171*A*.
MANGANIC OXIDE, effect on iron oxide at high temperatures, 199*A*.
MANGANIFEROUS IRON ORE :
  concentration, 88*A*.
  leaching, 194*A*.
MARTENSITE, lattice relationship to austenite, 223*A*.
MAURER'S DIAGRAM for cast iron, 67*A*.
MEEHANITE :
  for cylinder covers, 168*A*.
  properties, 31*A*.
  thermal cracking, 135*A*.
  use for crankshafts, 134*A*.
MEMBERS, election, 2*P*.
MERCURY ORE, concentration, 89*A*.
METALLOGRAPHIC POLISHING, cast iron, 124*A*.
METALLOGRAPHIC SPECIMENS, storage, 186*A*.
METALLOGRAPHY, development, 74*A*.
METALLOGRAPHY AND CONSTITUTION, 34*A*., 74*A*., 124*A*., 152*A*., 186*A*., 221*A*.
METALLURGISTS, training, 124*A*., 221*A*.
METHANE, decomposition, catalytic effect of metals and oxides, 3*A*.
MICA, thermal conductivity, 90*A*.
MICROBIOLOGICAL DEPOSITS :
  formation in water-circulating systems, 189*A*.
  formation in water-circulating systems, bibliography, 189*A*.

MICROPHOTOMETERS, 152*A*.
MICROSCOPE, electron, use of surface replicas of etched metals, 221*A*.
MICROSCOPIC EXAMINATION :
  metals, 124*A*.
  ore minerals, 34*A*.
MICROSTRUCTURE, iron ore, radiographic method of study, 76*A*.
MINERAL RESOURCES, 1*A*., 87*A*.
MINETTE ORE :
  sintering, 195*A*.
  smelting, 195*A*.
MINING :
  iron ore, Lincolnshire, 194*A*.
  iron ore, Minnesota, 194*A*.
MINNESOTA, iron-ore mining, 194*A*.
MIXER PRACTICE, English and American, 206*A*.
MIXING, iron ore, 89*A*.
MOLYBDENUM :
  determination in iron and steel, 157*A*.
  determination, use of photo-electric colorimeter, 205*A*.
  effect in cast iron, 31*A*.
  effect in cast iron, austenite transformation, 187*A*.
  effect in cast iron, machinability, 148*A*.
  effect in chromium-vanadium steel, 31*A*.
  effect in structural steel, brittleness, 32*A*.
MOLYBDENUM CAST IRON, thermal cracking, 135*A*.
MOLYBDENUM HIGH-SPEED STEEL :
  heat-treatment, 16*A*.
  properties, 73*A*., 122*A*.
MOLYBDENUM-NICKEL CAST IRON, production, 48*A*.
MOLYBDENUM ORE DEPOSITS, South America, 87*A*.
MOLYBDENUM STEEL :
  creep strength, effect of carbon, 149*A*., 150*A*.
  hardenability tests, 148*A*.
MOLYBDENUM-STEEL CASTINGS, properties, 220*A*.
MOLYBDENUM TOOL STEEL, properties, 144*A*.
MONEL METAL, damping capacity, 70*A*.
MONTANA :
  chromium ore deposits, 1*A*.
  manganese ore deposits, 1*A*.
MOORE'S METHOD for determination of iron, 157*A*.
MORTARS, production, 100*A*.
MOULDING :
  anchors, 202*A*.
  bombs, 136*A*.
  crusher casting, 101*A*.
  cylinder covers, 168*A*.
  engine bed-plate, 49*A*.
  gear wheels, 168*A*.
  large iron castings, 202*A*.
  pipe fittings, 134*A*.
  plough parts, 134*A*.
  rolls, 10*A*.
  shells, 49*A*.
  strickle, 101*A*.
MOULDING SAND :
  addition of clay slurry, 136*A*.
  bonding materials, 423*P*., 428*P*.
  British, composition and properties, 396*P*.
  effect of milling, 409*P*.
  effect of surface-tension-reducing agents, 413*P*.
  mixing, 9*A*.
  nature of clay substances, 100*A*.
  permeability, 414*P*.
  permeability tests, apparatus, 416*P*.
  reclamation, 9*A*.
  report of Sub-Committee, 393 *Paper*.
  tests, 48*A*., 100*A*., 136*A*.
  thermal conductivity of insulating mixtures, 420*P*.
  thermal expansion of sand-clay mixtures, 419*P*.
  use of Beacon bentonite substitute, 436*P*.
  use of Benbond, 430*P*.
  use of bentonite, 423*P*.
  use of clay, 428*P*.
  use of Colbond, 429*P*.
  use of Cummingbond, 437*P*.
  use of Distribond, 431*P*.
  use of fullers' earth, 422*P*.
  use of Perminal, 413*P*.
  use of Seconite, 436*P*.
  use of Silklay, 436*P*.
  use of Siolite, 436*P*.
MOULDS :
  drying, use of infra-red rays, 101*A*.
  for plastics, steels used, 122*A*.

N.A.X. HIGH-TENSILE STEEL, welding, 144*A*., 215*A*.
NAGAOKA-HONDA EFFECT, 70*A*.
NAILS, from St. Pierre, examination, 80*A*., 154*A*.
NATIONAL EMERGENCY STEELS, properties, 216*A*.
NEW JERSEY, mineral resources, 87*A*.

NEW MEXICO :
manganese ore deposits, 1*A*.
tin ore deposits, 1*A*.
NICARB PROCESS of case-hardening, 63*A*.
NICKEL :
damping capacity, 70*A*.
determination in alloy steel, 82*A*.
determination in iron and steel, 158*A*.
determination, use of photo-electric colorimeter, 205*A*.
effect in cast iron, 31*A*.
effect in cast iron, austenite transformation, 187*A*.
effect in cast iron, graphitisation, 101*A*.
effect in cast iron, machinability, 148*A*.
effect in structural steel, brittleness, 32*A*.
elastic properties, 119*A*.
electrodeposition, 24*A*., 113*A*.
electrodeposition, on irregular-shaped articles, 177*A*.
magnetisation near boundaries, 120*A*.
NICKEL CAST IRON :
effect of moisture and preheating of cupola blast, 97*A*.
structure, 223*A*.
NICKEL COATINGS, thickness determination, 177*A*.
NICKEL ORE DEPOSITS, South American, 87*A*.
NICKEL-PLATING SOLUTIONS, analysis, 228*A*.
NICKEL STEEL :
effect of tin, 141*P*.
pickling, 112*A*.
solubility of hydrogen, 181*P*.
structure, 223*A*.
transformations, 77*A*.
NICKEL STEEL CASTINGS :
lowering of nickel content, 33*A*.
properties, 220*A*.
NICKEL STEEL PLATES, welded, stresses, effect of preheating, 145*A*.
NIOBIUM. *See* Columbium.
NI-TENSILE, properties, 31*A*.
NITRIC ACID :
activation of passive iron, 190*A*.
corrosion of alloys, 125*A*.
corrosion of chromium-nickel steel, 192*A*.
corrosion of steel, 191*A*.
NITRIC ACID PLANTS, use of stainless steel, 151*A*.
NITRIDING :
chromium-molybdenum steel, 63*A*.
high-speed steel, 63*A*.
tank parts, 63*A*.
NITRO-CEMENTATION, 63*A*.
NITROGEN :
absorption by iron and iron alloys, 30*A*.
absorption by steel, 206*A*.
determination in iron and steel, 80*A*.
determination, use of photo-electric colorimeter, 205*A*.
effect in chromium-nickel steel, 121*A*.
effect in chromium steel, 121*A*.
NITROGEN-DIOXIDE PROCESS for recovery of manganese, 88*A*.
NODULISING, manganese ore, 88*A*.
NOTCHES, effect on welds, fatigue strength, 21*A*.
NULL METHOD of corrosion measurements, 127*A*.
NUTS, heat treatment, 18*A*.

OBITUARY NOTICES, deceased Members, 489*P*.
OIL, use for rust prevention, 188*A*.
OIL FUEL, supply system of Great Lakes Steel Corporation, 206*A*.
OIL-WELL PUMPS, heat treatment, 108*A*.
OPEN-HEARTH FURNACES :
acid, refractory materials, for, 162*A*.
basic, tilting, brick consumption, 16*P*.
basic, tilting, linings, 9 *Paper*.
bottoms, ramming with Ramix and Plastic K.N., 204*A*.
bottoms, repair, 207*A*.
bottoms, use of StaSet, 205*A*.
doors, water-cooled, 104*A*.
ports, water-cooled, 104*A*.
repair, 205*A*.
use of coke-oven gas, 207*A*.
use of magnesite refractories, 42*A*.
valves, Reiner, 11*A*.
OPEN-HEARTH IRON, elastic properties, 119*A*.
OPEN-HEARTH PERSONNEL, training, 204*A*.
OPEN-HEARTH PRACTICE :
acid, 104*A*., 204*A*.
acid, carbon control, 206*A*.
acid, slag control, 206*A*.
acid, use of light scrap, 206*A*.
American, 50*A*.
Australian, 206*A*.

OPEN-HEARTH PRACTICE (*contd.*)—
basic, 103*A*., 204*A*.
basic, slag control, 204*A*.
basic, use of blown metal, 206*A*.
effect of proportion of hot-metal charge on speed of operation, 51*A*.
heat consumed per ton of metallic charge, 51*A*.
pig-ore process, 205*A*.
recarburisation of charge with amorphous graphite, 52*A*.
scrap and pig charges, 169*A*.
use of soft ore, 206*A*.
OPEN-HEARTH PROCESS :
basic, heat requirements, 52*A*.
basic, iron ores for, 204*A*.
costs, 51*A*.
desulphurising reactions, 170*A*.
effect of increasing proportion of hot metal in charge, 205*A*.
OPEN-HEARTH STEEL, acid, gases in, 206*A*.
OPEN-HEARTH STEEL PLANTS, cost, 11*A*.
ORE BRIDGES, design, 2*A*.
ORE MINERALS, microscopic examination, 34*A*.
OREGON, chromium ore deposits, 1*A*.
ORES, mining and treatment, 2*A*., 41*A*., 88*A*., 131*A*., 194*A*.
OSTWALD-LILLIE METHOD of nerve conduction, 190*A*.
OVER-HEATING, steel, 106*A*.
OXIDATION :
metals, 128*A*., 224*A*.
steel, 157*P*.
See also Scaling.
OXIDE COATINGS :
on aluminium, 114*A*.
on iron and steel, 114*A*.
on magnesium, 114*A*.
protective value, 192*A*.
on steel, salt-spray test, 154*A*.
on zinc, 114*A*.
OXIDE FILMS :
balance for studying, 225*A*.
on iron, 127*A*.
removal by heating in vacuum, 213*A*.
OVIFAK IRON, corrosion, 225*A*.

PAINT, priming, specification, British, 182*A*.
PAINT COATINGS :
on steel, 182*A*.
substitute for zinc coatings, 117*A*.
PAINTING, precleaning of steel, 23*A*.
PAPER, use for foundry patterns, 101*A*.
PARCO-LUBRITE TREATMENT for steel, 114*A*.
PASSIVE IRON, activation in nitric acid, 190*A*.
PATENTING, wire, use of salt baths, 210*A*.
PATTERNS, foundry, use of paper, 101*A*.
PEARLITE, lattice relationships to austenite, 223*A*.
PENNSYLVANIA :
coal deposits, 1*A*.
mineral resources, 87*A*.
PERICLASE, conversion of magnesite, 131*A*.
PERMEABILITY, moulding sand, 414*P*.
PERMEABILITY TESTS, moulding sands, apparatus, 416*P*.
PERMINAL, use in moulding sand, 413*P*.
PHASES, intermetallic, linking, 153*A*.
PHOSPHATE COATINGS, 177*A*., 178*A*., 179*A*.
on condenser tubes, 179*A*.
on piston rings, 180*A*.
protective value, 192*A*., 224*A*.
sprayed, 180*A*.
on steel, 114*A*.
on steel prior to cold-work, 180*A*.
PHOSPHORUS :
determination in iron ore, 158*A*.
determination in pig iron, 82*A*.
determination in steel, 467*P*.
determination, use of photo-electric colorimeter, 205*A*.
effect in Bessemer steel, 122*A*.
effect in cast iron, austenite transformation, 187*A*.
effect in cast iron, machinability, 148*A*.
effect in steel, machinability, 27*A*.
effect in structural steel, brittleness, 32*A*.
PHOSPHORUS PRINTS, production, 75*A*.
PHOTO-ELECTRIC ABSORPTIOMETER, Spekker, use in analysis, 227*A*.
PHOTELOMETER, use in analysis, 205*A*.
PHOTOMETRIC METHOD of analysis, 82*A*.
PHOTOMICROGRAPHY, 34*A*.
PICKLING :
cathodic, 23*A*.
chromium steel, 112*A*.
effect on corrosion of metals in soil, 115*P*.
nickel steel, 112*A*.
steel, 176*A*.

PICKLING LIQUOR, utilisation, 112*A*.
PIG FOOD, corrosion of galvanised vessels, 192*A*.
PIG IRON :
analysis, 82*A*.
desiliconising, 2*A*.
desulphurisation, 94*A*.
desulphurisation, soda ash treatment, 133*A*.
PIGMENTS, Thermocolor, for measurement of temperatures, 142*A*.
PIPE FITTINGS, moulding, 134*A*.
PIPES :
boiler, specification, British, 152*A*.
corrosion in soils, 38*A*., 126*A*.
PISTON RINGS, phosphate coatings, 180*A*.
PLASTIC K.N. for open-hearth bottoms, 204*A*.
PLASTICS, moulding, use of steel, 172*A*.
PLASTICS INDUSTRY, steel for, 122*A*.
PLATE MILLS, electric driving, 14*A*.
PLATES :
boiler, recrystallisation during hot working, 68*A*.
welded, bend-fatigue tests, 20*A*.
PLOUGH PARTS, moulding, 134*A*.
POLAND, roasting of iron ore, 131*A*.
POLAROGRAPH, use in analysis, 83*A*., 158*A*., 228*A*.
POLISHING :
electrolytic, 34*A*., 186*A*.
metallographic, cast iron, 124*A*.
POROSITY :
in castings, 49*A*.
coke, determination, 93*A*.
PORTS, water-cooled, for open-hearth furnaces, 104*A*.
POTASSIUM CHLORIDE, recovery from flue dust, 199*A*.
POTASSIUM CHROMATE, use as corrosion inhibitor, 73*P*.
POWDER METALLURGY, 8*A*., 46*A*.
terms used, 8*A*.
POWDERED IRON :
manufacture of gears and bushes, 46*A*.
production of gears, 200*A*.
sintering, 95*A*.
PRECIPITATION HARDENING, iron-columbium alloys, 72*A*.
PRESSES :
hydraulic, 58*A*.
toggle-actuated, 209*A*.
PRESSING, metals, 13*A*.
PRESSURE GAUGES, 16*A*.
PRESSURE TESTS, boiler tubes, 28*A*.
PRESSURE VESSELS, stainless steel, welding, 175*A*.
PRODUCERS :
dust-catchers for, 6*A*.
use of low-grade fuel, 165*A*.
use of low-temperature coke, 196*A*.
PULVERISED COAL. *See* Coal, pulverised.
PUMP PARTS, heat treatment, 108*A*.
PYROMETRY, 60*A*., 142*A*.
See also Thermometers *and* Thermocouples.

QUENCHING :
high-speed steel, 76*A*.
gear-wheel teeth, after tempering, 183*A*.
steel, 19*A*., 117*A*.

RADIANT HEAT, use for heat-treatment furnaces, 61*A*.
RADIOGRAPHIC METHOD of studying microstructure of iron ore, 76*A*.
RADIOGRAPHS, intensifying screens for, 76*A*.
RAILS :
defects, 69*A*.
flame hardening, 62*A*.
heat-treated, use, 220*A*.
sorbitic treatment, Sandberg process, 221*A*.
RAMIX for open-hearth bottoms, 204*A*.
RECALESCENCE POINTS, determination, 222*A*.
RECARBURISATION, steel in open-hearth practice with amorphous graphite, 52*A*.
RECRYSTALLISATION :
boiler plate during hot working, 68*A*.
silicon ferrite, 223*A*.
RECTIFIERS, Ignitron, for rolling-mill motors, 141*A*.
REELING, strip, speed and tension control, 59*A*.
REFRACTORY MATERIALS, 3*A*., 42*A*., 89*A*., 131*A*., 162*A*., 195*A*.
action of slag, 162*A*., 196*A*.
consumption in tilting furnaces, 16*P*.
for blast-furnaces, 90*A*.
effect of decomposition of carbon monoxide and methane, 3*A*.
for electric furnaces, 90*A*.
heat-treatment, 162*A*.
for malleable iron furnaces, 90*A*.
for open-hearth furnaces, 162*A*.
thermal conductivity, 90*A*.
use in arc furnaces, 42*A*., 43*A*.

REFRACTORY MATERIALS (CARBON BLOCKS) for blast-furnace hearths, 162*A*.
REFRACTORY MATERIALS (CHROME-MAGNESITE BRICKS), use in arc furnaces, 43*A*.
REFRACTORY MATERIALS (CHROME ORE), properties, 42*A*.
REFRACTORY MATERIALS (CHROMITE), from Shetland, properties, 89*A*.
REFRACTORY MATERIALS (DOLOMITE), use for arc-furnace hearths, 43*A*.
REFRACTORY MATERIALS (FIRECLAY BRICKS), manufacture and properties, 3*A*.
REFRACTORY MATERIALS (MAGNESITE):
conversion to periclase, 131*A*.
for high-frequency furnaces, 54*A*., 55*A*.
use in open-hearth furnaces, 42*A*.
REFRACTORY MATERIALS (SILICA BRICKS):
action of slag, 89*A*.
use for arc-furnace roofs, 42*A*., 43*A*.
REFRACTORY MATERIALS (SILICON-CARBIDE BRICKS), properties, 195*A*.
REHEATING FURNACES, 105*A*., 139*A*., 209*A*.
for blooms and billets, 209*A*.
design, 105*A*.
fuel cost standards, 43*A*., 91*A*.
use of long-distance gas, 105*A*.
use of pulverised coal, 132*A*.
REINER VALUE, 11*A*.
RESIDUAL METALS, in steel, 169*A*.
RESISTOR FURNACES. *See* Electric Furnaces.
RHODIUM, electrodeposition, 113*A*.
RIMMING STEEL:
Bessemer, manufacture and composition, 295 *Paper*, 327 *Paper*.
carbon diffusion, 357 *Paper*.
open-hearth, carbon content of core, 289*P*.
open-hearth, composition variation from outside to centre, 345 *Paper*.
open-hearth, manufacture and composition, 283 *Paper*.
open-hearth sulphides in, 288*P*.
"RISS" definition, 119*A*.
RIVETS, properties, 151*A*.
R.K. PROCESS for decarburisation of iron, 7*A*.
ROASTING:
iron ore in Czechoslovakia, 131*A*.
iron ore in Poland, 131*A*.
RÖCHLING STEELWORKS, strip mills, 14*A*., 141*A*.
RÖCKNER ROLLING MILL, 211*A*.
ROLLING:
billets, cost, 141*A*.
cold, cooling of rolls, 141*A*.
cold, effect on transformer steel, 120*A*.
free-cutting steel, 59*A*.
strip, effect of tension, 15*A*.
temper, strip, 141*A*.
ROLLING-MILL PLANT:
Algoma Steel Corporation, Ltd., 11*A*.
Atlantic Steel Co., 169*A*.
B.M. Rolling Mills, Ltd., 142*A*.
Carnegie-Illinois Steel Corp., 15*A*.
Dominion Foundries & Steel, Ltd., 137*A*.
Röchling Steelworks, 14*A*., 141*A*.
Steel Company of Canada, Ltd., 137*A*.
ROLLING-MILL PRACTICE, 14*A*., 59*A*., 141*A*., 210*A*.
ROLLING-MILL TABLES, torque of rolls, 60*A*.
ROLLING MILLS:
bearings, synthetic resin, 210*A*.
billet, electric driving, 14*A*.
control instruments for, 16*A*.
electric driving, 14*A*.
electric driving, use of d.c. system, 210*A*.
motors, Ignition rectifiers, 141*A*.
motors, I.R. drop compensation, 210*A*.
plate, electric driving, 14*A*.
Röckner, 211*A*.
roll changing, 15*A*.
strip, 15*A*., 142*A*., 211*A*.
strip, Broemel system, 14*A*., 141*A*.
strip, design, 59*A*.
strip, electric driving, 14*A*.
strip, lubrication, 14*A*.
ROLLING PROCESS, theory, 14*A*.
ROLLS:
changing, 15*A*.
chilled, production, 201*A*.
cooling, 141*A*.
moulding, 10*A*.
RUSTON & HORNSBY, LTD., foundry plant, 95*A*.

S-CURVES, low alloy steel, 118*A*.
ST. PIERRE, examination of nails from, 80*A*., 154*A*.

SALT-BATH CONTAINERS, corrosion, 227*A*.
SALT BATHS :
use in heat treatment, 17*A*., 143*A*., 173*A*., 212*A*.
use in heat treatment, cyanide determination, 62*A*.
use in heat-treatment, position and shape of electrodes, 107*A*.
use in patenting of wire, 210*A*.
SALT-SPRAY TESTS, tests on oxide coatings, 154*A*.
SANDBERG PROCESS of treating rails, 221*A*.
SCALE, removal from steel, 112*A*.
SCALING :
cast iron, effect aluminium coatings, 182*A*.
heat-resistant steel, 17*A*., 63*A*.
steel, effect of vanadium, 17*A*., 214*A*.
SCARFING, billets, 22*A*., 175*A*.
SCRAP :
alloy steel, identification by spark tests, 120*A*.
light, use in open-hearth practice, 206*A*.
recovery from slag, 169*A*., 206*A*.
recovery of tin, 25*A*.
stainless steel, utilisation in America, 12*A*.
SEA WATER, corrosion of steel, 191*A*.
SECONITE, use in moulding sand, 436*P*.
SELENIUM, effect in steel, machinability, 148*A*.
SESCI FURNACES :
linings, materials for, 63*P*., 67*P*.
linings, patching process, 66*P*.
production of steel castings, 53 *Paper*.
SHARPENING, drills, 212*A*.
SHEAR STRENGTH, spot welds, 65*A*.
SHEARS, control instruments for, 16*A*.
SHEETS :
corrosion in soils, 38*A*.
levelling, 59*A*.
stainless steel, properties, 146*A*.
stretch-forming, 140*A*.
thin, drawability, evaluation, 58*A*.
SHELL STEEL, manufacture, 11*A*.
SHELLS :
drawing, 140*A*.
forging, 140*A*.
forging, " one-shot " method, 12*A*.
forging, Witter process, 13*A*.
heat treatment, 107*A*.
moulding, 49*A*.
SHETLAND, properties of chromite, 89*A*.
SHOTWELD PROCESS for welding stainless steel, 110*A*.
SHRINKAGE, malleable cast iron, 48*A*.
SIER-BATH GEAR CO., heat-treatment plant, 173*A*.
SILICA :
effect on carbon monoxide, decomposition, 3*A*.
effect on iron oxide at high temperatures, 199*A*.
SILICA BRICKS. *See* Refractory Materials.
SILICON :
determination in pig iron, 82*A*.
determination in iron and steel, photometric method, 82*A*.
determination, use of photo-electric colorimeter, 205*A*.
effect in cast iron, 31*A*.
effect in cast iron, austenite transformation, 187*A*.
effect in cast iron, carbon saturation, 122*A*.
effect in cast iron, graphitisation, 101*A*.
effect in cast iron, machinability, 148*A*.
effect in free-cutting steel, machinability, 148*A*.
effect in steel, 73*A*.
effect in steel, machinability, 27*A*.
removal from pig iron, 2*A*.
SILICON BRIQUETTES, addition to cast iron, 201*A*.
SILICON-CARBIDE BRICKS. *See* Refractory Materials.
SILICON FERRITE, recrystallisation, 223*A*.
SILICON IRON :
magnetisation near boundaries, 120*A*.
manufacture, 133*A*.
SILICON STEEL :
effect of cold rolling and annealing, 120*A*.
magnetostriction, 70*A*.
SILICON-STEEL CASTINGS, properties, 220*A*.
SILICONISED STEEL, wear tests, 147*A*.
SILKLAY, use in moulding sand, 436*P*.
SILVER, electrodeposition, 113*A*.
SINGER PROCESS of phosphatising, 180*A*.
SINTER, use in blast-furnaces, 94*A*., 195*A*.
SINTERING :
blast-furnace flue dust, 195*A*.
iron ore, 2*A*., 195*A*., 206*A*.
iron powders, 95*A*.
manganese ore, 88*A*.

SINTERING (*contd.*)—
Minette ore, 195*A*.
SINTERING PLANT :
heat balances, 89*A*.
Great Lakes Steel Corporation, 195*A*.
Greenawalt, at Julienhütte, 2*A*.
SIOLITE, use in moulding sand, 436*P*.
SLAG :
action on refractory materials, 162*A*., 196*A*.
action on silica bricks, 89*A*.
blast-furnace. *See* Blast-Furnace Slag.
control, in open-hearth practice, 204*A*., 206*A*.
recovery of scrap, 169*A*., 206*A*.
vanadium bearing, analysis, 83*A*.
SLAG-METAL EQUILIBRIA :
effect of foreign ions, 171*A*.
electric furnace process, 56*A*.
study with use of rotating induction furnace, 104*A*.
SLITTING MILLS, history, 15*A*.
SMELTING, minette ore, 195*A*.
SOCIÉTÉ ANON. DES HAUTS FOURNEAUX, FORGES ET ACIÉRIES DE DENAIN ET D'ANZIN, rimming steel ingots made by, 295 *Paper*.
SODA ASH :
use for desulphurisation of cast iron, 98*A*.
use for desulphurisation of pig iron, 133*A*.
SODIUM CARBONATE, use as corrosion inhibitor, 73*P*.
SODIUM CHLORIDE, corrosion of alloys, 125*A*.
SODIUM VANADATE, use as corrosion inhibitor, 73*P*.
SOILS :
corrosion of bolts, 126*A*.
corrosion of brass, 127*A*.
corrosion of cast iron, 110*P*.
corrosion of chromium-copper steel, 110*P*.
corrosion of chromium steel, 110*P*., 126*A*.
corrosion of copper and copper alloys, 126*A*., 127*A*.
corrosion of copper-molybdenum steel, 126*A*.
corrosion of copper steel, 110*P*.
corrosion of galvanised steel, 126*A*.
corrosion of ingot iron, 110*P*.
corrosion of iron and steel, 107 *Paper*, 38*A*., 126*A*., 127*A*.
corrosion of lead, 127*A*.
SOILS (*contd.*)—
corrosion of malleable cast iron, 126*A*.
corrosion of pipes, 39*A*.
corrosion of sheets, 39*A*.
corrosion of stainless steel, 127*A*.
corrosion of wrought iron, 110*P*., 126*A*.
corrosion of wrought iron, cadmium plated, 126*A*.
corrosion of zinc, 110*P*., 127*A*.
corrosiveness, determination, 122*P*.
SOLIDIFICATION, steel castings, 203*A*.
SOLUBILITY :
hydrogen in iron and iron alloys, 181 *Paper*.
hydrogen in iron-nickel alloys, 181*P*.
hydrogen in nickel steel, 181*P*.
SOUTH AMERICA, mineral resources, 87*A*.
SPARK TESTS, steel, 120*A*.
SPECIFICATIONS :
air-cooled blast-furnace slag, British, 167*A*.
aircraft steel, American, 34*A*.
boiler pipes, British, 152*A*.
boiler steel, British, 34*A*.
electric-arc welding plant, British, 146*A*.
gas cylinders, British, 185*A*.
lead-base priming paint, British, 182*A*.
steel for armaments and vehicles, British, 185*A*.
steel, co-ordination, 123*A*.
structural steel for shipbuilding, British, 185*A*.
wire, British, 185*A*.
SPECTROPHOTOMETER, use in analysis, 82*A*.
SPECTRUM ANALYSIS :
inclusions, 81*A*.
instruments used in, 152*A*.
determination of copper and tin, 205*A*.
iron and steel, 81*A*.
SPEKKER PHOTO-ELECTRIC ABSORPTIOMETER, use in analysis, 227*A*.
SPINDEL WEAR TEST, effect of testing conditions, 26*A*.
SPINNING, stainless steel, 209*A*.
SPONGE CHROMIUM, production, 131*A*.
SPRAYING :
copper, 181*A*.
metals, 115*A*.
phosphate coatings, 180*A*.
SPRING WIRE, properties, 71*A*.

SPRINGS :
aeronautical instrument, characteristics, 150*A*.
manufacture, 13*A*.
STAFFORDSHIRE, chain making industry, 106*A*.
STAINLESS CLAD STEEL :
production, 113*A*.
production, Jessop method, 113*A*.
STAINLESS STEEL :
corrosion in hydrochloric acid, 127*A*.
corrosion in soils, 127*A*.
deep drawing and pressing, 209*A*.
electrodeposition of metals, 180*A*.
electrolytic cleaning, 112*A*.
use in aircraft construction, 74*A*.
use in nitric acid plants, 151*A*.
welding, 66*A*., 144*A*., 145*A*., 175*A*.
welding, Shotweld process, 110*A*.
STAINLESS-STEEL SCRAP, utilisation in America, 12*A*.
STAINLESS-STEEL SHEETS, properties, 146*A*.
STAINLESS-STEEL STRIP, annealing furnace, 18*A*.
STAMPINGS, surface area determination, 176*A*.
"STASET" for open-hearth bottoms, 205*A*.
STATISTICAL ANALYSIS, use in corrosion studies, 156*A*.
STEAM, reaction with iron, 225*A*.
STEEL :
aircraft, specifications, American, 34*A*.
alloy, analysis, 83*A*.
alloy, damping capacity, 70*A*.
alloy, determination of nickel, 82*A*.
alloy, effect of tin, 141 *Paper*.
alloy (low), properties, 216*A*.
alloy (low), S-curves, 118*A*.
alloy (low), use for aircraft construction, 74*A*., 221*A*.
alloy (low), weldability tests, 19*A*.
annealing, bright, 64*A*.
austenitic, machinability, effect of elements, 148*A*.
boiler, intercrystalline cracking, 156*A*.
boiler, specifications, British, 34*A*.
brittleness, effect of hydrogen, 30*A*.
bullet-proof, production, 171*A*.
case-hardened, wear tests, 147*A*.
case-hardening, selection for gear manufacture, 16*A*.
clad, production, 113*A*.
cleaning prior to painting, 23*A*.
cold-working, pretreatment by phosphatising, 180*A*.
STEEL (*contd.*)—
corrosion in water, use of inhibitors and their effect on heat transfer, 73 *Paper*.
creep, 149*A*.
damping capacity, 70*A*.
dead, 147*A*.
defects, 119*A*., 208*A*.
deoxidation with titanium, 100*A*.
desulphurisation, 52*A*.
desulphurisation with calcium silicates, 138*A*.
desulphurisation in open-hearth process, 170*A*.
dynamo, effect of cold rolling and annealing, 120*A*.
effect of boron, 121*A*.
effect of cold work, 26*A*.
effect of deoxidisers, 219*A*.
effect of elements, 117*A*.
effect of heat treatment, 117*A*.
effect of hydrogen, 72*A*.
effect of silicon, 73*A*.
elastic properties, 119*A*.
enamel coatings, blisters, 115*A*.
enamel coatings, effect of oxide coatings, 116*A*.
evolution of hydrogen, 205*P*.
fatigue strength at low temperatures, 218*A*.
flake formation, 53*A*.
free-cutting, machinability, effect of elements, 148*A*.
free-cutting, production, 51*A*., 170*A*.
free-cutting, rolling, 59*A*.
fractures, woody, 35*A*.
grain growth, effect of capillarity in grain boundaries, 36*A*.
grain size, determination, 124*A*.
hair-line cracks, effect of carbon, 229*P*.
hardenability, 69*A*., 219*A*.
heat-resistant, properties, 123*A*.
heat-resistant, scaling, 17*A*., 63*A*.
high sulphur, effect of tin, 206*A*.
high-sulphur, welding flux for, 215*A*.
high-tensile, weldability tests, 20*A*., 67*A*.
high-tensile, welding, 144*A*., 215*A*.
killed, addition of aluminium, 206*A*.
liquid, gas content, 52*A*.
liquid, gases in, analysis, 80*A*.
liquid, hydrogen content, 52*A*.
low-carbon, case-hardening, 143*A*.
machinability, effect of elements, 27*A*., 148*A*.
magnetisation near boundaries, 120*A*.

STEEL (*contd.*)—
National Emergency, properties, 216*A*.
nitrogen absorption, 206*A*.
non-magnetic, use for wrapping wire, 33*A*.
over-heating, 106*A*.
oxidation, 157*P*.
phosphate coatings, 114*A*.
pickling, 112*A*., 176*A*.
production, 11*A*., 50*A*., 103*A*., 137*A*., 169*A*., 203*A*.
production in resistor furnaces, 11*A*.
quenching, 19*A*., 117*A*.
recarburisation in open-hearth practice with amorphous graphite, 52*A*.
residual metals, 169*A*.
rimming, Bessemer, manufacture and composition, 295 *Paper*, 327 *Paper*.
rimming, carbon diffusion, 357 *Paper*.
rimming, open-hearth, carbon content of core, 289*P*.
rimming, open-hearth, composition variation from outside to centre, 345 *Paper*.
rimming, open-hearth, manufacture and composition, 283 *Paper*.
rimming, open-hearth, sulphides in, 288*P*.
rolling properties, effect of tin, 206*A*.
scale removal, 112*A*.
scaling, effect of vanadium, 17*A*., 214*A*.
shell, manufacture, 11*A*.
siliconised, wear tests, 147*A*.
specifications, British, 185*A*.
specifications, co-ordination, 123*A*.
sulphite-treated, production, 170*A*.
transformations, effect of diffusion, 77*A*.
transformer, effect of cold rolling and annealing, 120*A*.
use for aircraft construction, 74*A*.
use for moulding of plastics, 172*A*.
weldability tests, 19*A*., 66*A*., 109*A*.
welding, spot, 175*A*.
STEEL COMPANY OF CANADA, LTD., plant, 137*A*.
STEEL FOUNDRIES, productive capacity, 202*A*.
STEEL FOUNDRY PRACTICE, British, 98*A*.
STEEL PLANT :
Algoma Steel Corporation, Ltd., 11*A*.
STEEL PLANT (*contd.*)—
Atlantic Steel Co., 169*A*.
Companhia Siderurgica Belgo-Mineira, 11*A*.
Copperweld Steel Co., 203*A*.
Dominion Foundries & Steel, Ltd., 137*A*.
planning of production, 105*A*.
Samuel Fox & Co., Ltd., 203*A*.
Steel Company of Canada, Ltd., 137*A*.
STOKERS, mechanical, for metallurgical furnaces, 43*A*.
STOOLS, for ingot moulds, 56*A*., 206*A*., 207*A*.
STRAIN GAUGES, 16*A*.
STRESS :
determination, 217*A*.
measurement, use of X-rays, 68*A*.
STRESS-RELIEF, welded joints, 64*A*.
STRESSES :
effect on hair-line crack formation, 251*P*., 253*P*.
in welded joints, 109*A*.
in welded plates, effect of preheating, 145*A*.
principal, effect on fatigue strength, 184*A*.
tensile and reversed, structure of metals under, 147*A*.
STRETCH-FORMING, sheets, 140*A*.
STRIP :
electrolytic tinning, 24*A*.
levelling, 59*A*.
polishing belts, electric control, 16*A*.
reeling, speed and tension control, 59*A*.
rolling, effect of tension, 15*A*.
stainless steel, annealing furnace, 18*A*.
temper rolling, 141*A*.
width gauge, 16*A*.
STRIP MILLS, 15*A*., 142*A*., 211*A*.
Broemel system, 14*A*., 141*A*.
design, 59*A*.
electric driving, 14*A*.
lubrication, 14*A*.
STRONTIUM ORE, concentration, 89*A*.
STRUCTURAL STEEL :
brittleness, effect of elements, 32*A*.
for shipbuilding, specification, British, 185*A*.
STRUCTURE :
iron, wüstite and magnetite, 157 *Paper*.
metals under tensile and reversed stresses, 147*A*.
nickel cast iron, 223*A*.
nickel steel, 223*A*.

SULPHIDES, in rimming steel, 288*P*.
SULPHITE-TREATED STEEL, production, 170*A*.
SULPHUR :
determination in coal and coke, 83*A*.
determination in pig iron, 82*A*.
determination in steel, 467*P*.
determination in steel, limits of accuracy, 468*P*.
determination, use of Leco apparatus, 205*A*.
effect in cast iron, 151*A*.
effect in cast iron, austenite transformation, 187*A*.
effect in cast iron, machinability, 148*A*.
effect in steel, machinability, 27*A*., 148*A*.
SULPHUR DIOXIDE :
determination in flue gases, 83*A*.
effect in boiler feed water, 189*A*.
SULPHUR PRINTS, production, 75*A*.
SULPHURIC ACID :
corrosion of alloys, 125*A*.
corrosion of steel, 191*A*.
SURFACE QUALITY, determination, 74*A*.
SWELLING, coal, 164*A*., 165*A*.
SWELLING TESTS :
coal, British Standard method, 164*A*.
coal, Gray-King method, 164*A*.
coal, Lessing method, 164*A*.
SYMBOLS, for heterogeneous equilibria, 153*A*.

TACONITE, treatment, 2*A*.
TALBOT PROCESS, Witkowitz Works, 103*A*.
TANK PARTS, nitriding, 63*A*.
TANTALUM ORE DEPOSITS, South America, 87*A*.
TARNISHING, metals, 128*A*., 224*A*.
TEMPER-BRITTLENESS, structural steel, effect of elements, 32*A*.
TEMPER ROLLING, strip, 141*A*.
TEMPERATURES :
control, in chromium plating, 177*A*.
distribution in coke-oven walls, 92*A*.
effect of creep strength, 27*A*.
high, embrittlement of chromium-molybdenum-nickel steel, 29*A*.
high, embrittlement of chromium-molybdenum steel, 29*A*.
high, embrittlement of chromium steel, 29*A*., 71*A*.
TEMPERATURES (*contd.*)—
high, properties of chromium-molybdenum-vanadium steel, 30*A*.
high, properties of chromium-nickel steel, 220*A*.
low, fatigue strength of steel, 218*A*.
measurement, use of Thermocolor pigments, 142*A*.
TEMPERING :
quenching of steel after, 183*A*.
tools, 62*A*.
TEMPLETON KENLY CO., heat-treatment plant, 173*A*.
TENSILE PROPERTIES, stainless-steel sheets, 146*A*.
TENSILE STRENGTH :
determined by hardness tests, 218*A*.
welded joints, 108*A*.
TENSILE TESTS, effect of speed of loading, 25*A*.
TESTING MACHINE, corrosion, 224*A*.
TESTS :
acoustic, 67*A*.
agglutinating value, coal, 93*A*.
bend, notched-bar, 25*A*.
bend, weld metal, 20*A*., 67*A*.
bend-fatigue, welded plates, 20*A*.
coking, coal, Agde-Damm method, 44*A*.
coking, coal, Davis method, 44*A*.
coking, coal, Gieseler method, 44*A*., 165*A*.
corrosion, atmospheric, 39*A*.
creep, boiler tubes, 28*A*.
electrical, 68*A*.
fillet and plug welds, 145*A*.
hardenability, chromium-molybdenum-nickel steel, 148*A*.
hardenability, molybdenum steel, 148*A*.
hardness, for determining tensile strength, 218*A*.
hardness, scatter in, 120*A*.
magnetic, 68*A*.
moulding sands, 48*A*., 100*A*., 136*A*.
non-destructive, 67*A*.
permeability, moulding sands, apparatus, 416*P*.
pressure, boiler tubes, 28*A*.
salt spray, on oxide coatings, 154*A*.
spark, steel, 120*A*.
swelling, coal, British Standard method, 164*A*.
swelling, coal, Gray-King method, 164*A*.
swelling, coal, Lessing method, 164*A*.

TESTS (*contd.*)—
tensile, effect of speed of loading, 25*A*.
tool steel, 27*A*.
wear, case hardened steel, 147*A*.
wear, siliconised steel, 147*A*.
weldability, chromium-copper steel, 110*A*.
weldability, high-tensile steel, 20*A*., 67*A*.
weldability, steel, 19*A*., 66*A*., 109*A*.
THERMAL CONDUCTIVITY :
carbon, 90*A*.
fibrous materials, 90*A*.
granular material, 90*A*.
graphite, 91*A*.
insulating bricks, 90*A*.
mica, 90*A*.
moulding sand, 420*P*.
refractory materials, 90*A*.
THERMAL EXPANSION, moulding sand, 419*P*.
THERMOCOLOR PIGMENTS for measurement of temperatures, 142*A*.
THERMOCOUPLES, construction, 60*A*.
THERMOMETERS :
electric-resistance, theory, 60*A*.
platinum-resistance, calibration, 60*A*.
THICKNESS, gauges for determining, 16*A*.
THORIUM, effect in cast iron, 121*A*.
TILTING FURNACES :
brick consumption, 16*P*.
linings, 9 *Paper*.
TIN :
determination, spectrographic method, 205*A*.
effect in alloy steel, 141 *Paper*.
effect in carbon steel, 141*P*.
effect in chromium-molybdenum-nickel steel, 141*P*.
effect in chromium-molybdenum steel, 141*P*.
effect in chromium-nickel steel, 141*P*.
effect in galvanising bath on coatings, 181*A*.
effect in high-sulphur steel, 206*A*.
effect in manganese-molybdenum steel, 141*P*.
effect in nickel steel, 141*P*.
effect in steel, rolling properties, 206*A*.
electrodeposition, 24*A*., 113*A*., 114*A*., 182*A*.
recovery from scrap, 25*A*.
TIN ORE DEPOSITS, New Mexico, 1*A*.
TINPLATE, production, use of ammonium stannous oxalate baths, 115*A*.
TITANIUM :
deoxidation with steel, 100*A*.
determination in alloys, mercury cathode method, 82*A*.
effect in cast iron, machinability, 148*A*.
effect in chromium-vanadium steel, 31*A*.
effect in free-cutting steel, machinability, 148*A*.
TITANIUM CARBIDE, in titanium steel, 481*P*.
TITANIUM NITRIDE in titanium steel, 481*P*.
TITANIUM ORE, concentration, 89*A*.
TITANIUM ORE DEPOSITS, South America, 87*A*.
TITANIUM OXIDE, effect on iron oxide at high temperatures, 199*A*.
TITANIUM STEEL, carbide and nitride particulars, 481*P*.
TOOL STEEL :
heat treatment and selection, 212*A*.
ingot moulds for, 56*A*.
properties, 144*A*.
tests, 27*A*.
tungsten, uses, 111*A*.
welding, atomic hydrogen, 145*A*.
TOOLS :
cemented carbide, 22*A*.
cutting, performance, 22*A*., 111*A*.
tempering, 62*A*.
TRACTOR PARTS, forging, 172*A*.
TRANSFORMATIONS :
austenite, in cast iron, effect of elements, 186*A*.
austenite in high-speed steel, 76*A*.
in nickel steel, 77*A*.
in steel, effect of diffusion, 77*A*.
TRANSFORMER STEEL, effect of cold rolling and annealing, 120*A*.
TROPENAS CONVERTERS, production of steel castings, 135*A*.
TUBES :
boiler, pressure and creep tests, 28*A*.
condenser, phosphate coatings, 179*A*.
TUNGSTEN ORE DEPOSITS :
California, 1*A*.
Colorado, 1*A*.
Idaho, 87*A*.
South America, 87*A*.
TUNGSTEN STEEL :
production in Australia, 95*A*.
use for magnets, 148*A*.

TUNGSTEN TOOL STEEL :
properties, 144*A*.
uses, 111*A*.
TURBINE BLADES, corrosion, 38*A*.
TYRES, defects, 69*A*.

UNDERCOOLING, cast iron, 102*A*.
UNITED KINGDOM :
mixer practice, 206*A*.
specification for air cooled blast-furnace slag, 167*A*.
specification for boiler pipes, 152*A*.
specifications for boiler steel, 34*A*.
specification for electric-arc welding plant, 146*A*.
specification for gas cylinders, 185*A*.
specification for lead-base priming paint, 182*A*.
specifications for steel for armaments and vehicles, 185*A*.
specification for structural steel for shipbuilding, 185*A*.
specification for wire, 185*A*.
steel foundry practice, 98*A*.
UNITED STATES :
blast-furnace practice, 2*A*.
coal deposits, 1*A*.
chrome ore deposits, 1*A*.
chrome ore position, 87*A*.
consumption of aluminium in steel industry, 53*A*.
development of duplex process, 137*A*., 204*A*.
iron-ore industry, 2*A*.
manganese ore deposits, 1*A*., 87*A*.
manufacture of ferro-chromium, 41*A*.
mixer practice, 206*A*.
open-hearth practice, 50*A*.
refractories for electric furnaces, 90*A*.
specifications for aircraft steel, 34*A*.
tin ore deposits, 1*A*.
tungsten ore deposits, 1*A*., 87*A*.
utilisation of stainless steel scrap, 12*A*.
National Emergency Steels, 216*A*.
UPSET FORGING MACHINE, 172*A*.

VALVES :
hot blast, design, 198*A*.
Reiner, for open-hearth furnaces, 11*A*.
VANADIUM :
determination in iron and steel, 83*A*.
VANADIUM (*contd.*)—
effect in cast iron, machinability, 148*A*.
effect in free-cutting steel, machinability, 148*A*.
effect in steel, scaling, 17*A*., 214*A*.
recovery from blast-furnace slag, "bottom-reaction" process, 45*A*.
VANADIUM-BEARING SLAG, analysis, 83*A*.
VANADIUM ORE, concentration, 89*A*.
VANADIUM ORE DEPOSITS, South America, 87*A*.
VANADIUM STEEL, creep strength, effect of carbon, 149*A*., 150*A*.
VILLARI EFFECT, 70*A*.

WAD ORE, concentration, 195*A*.
WASTE HEAT BOILERS, 4*A*.
WATER CIRCULATING SYSTEM :
microbiological deposits, 189*A*.
microbiological deposits, bibliography, 189*A*.
WATER-LINE ATTACK in corrosion of steel, 73*P*.
WATERTOWN ARSENAL, centrifugal casting, 49*A*.
WEAR :
blast-furnace linings, 162*A*.
cast iron, 219*A*.
WEAR TESTS :
case hardened steel, 147*A*.
siliconised steel, 147*A*.
Spindel, effect of testing conditions, 26*A*.
WELD METAL :
bend tests, 20*A*., 67*A*.
hardness, effect of composition, 175*A*.
WELDABILITY, copper steel, 150*A*.
WELDABILITY TESTS :
chromium-copper steel, 110*A*.
high-tensile steel, 20*A*., 67*A*.
steel, 19*A*., 66*A*., 109*A*.
WELDED BRIDGES, cracks in, 21*A*.
WELDED FACINGS, properties, 20*A*.
WELDED JOINTS :
corrosion resistance, 215*A*.
galvanising, 181*A*.
preheating and stress relieving, 64*A*.
stresses in, 109*A*.
tensile strength, 108*A*.
WELDED PLATES :
bend fatigue tests, 20*A*.
stresses, effect of preheating, 145*A*.
WELDING :
atomic hydrogen, tool steel, 145*A*.
bronze, cast iron, 175*A*.

WELDING (*contd.*)—
chromium - cobalt - molybdenum - nickel steel, 151*A*.
chromium - columbium - nickel - titanium steel, 151*A*.
chromium-manganese steel, 151*A*.
chromium - molybdenum - nickel steel, 151*A*.
chromium-nickel steel, 151*A*.
chromium-nickel steel, Shotweld process, 110*A*.
chromium-silicon-zirconium steel. 144*A*.
chromium steel, 111*A*.
electric arc, stainless steel, 66*A*.
electric arc, transfer of metal, 65*A*.
high-speed steel tips to carbon steel shanks, 111*A*., 145*A*.
high-tensile steel, 144*A*., 215*A*.
pressure vessels, 175*A*.
spot, mild steel, 175*A*.
stainless steel, 144*A*., 145*A*., 175*A*.
WELDING ELECTRODES, arc, economical use, 174*A*.
WELDING FLUX, for high-sulphur steel, 215*A*.
WELDING MACHINES, electric, 214*A*.
WELDING PLANT, electric arc, specification, British, 146*A*.
WELDS :
butt, properties, effect of welding procedure, 66*A*.
fatigue strength, 146*A*.
fatigue strength, effect of notches, 21*A*.
fillet, tests, 145*A*.
plug, tests, 145*A*.
spot, shear and impact strength, 65*A*.
WERTHEIM EFFECT, 70*A*.
WHEELS, chilled, production, 167*A*.
WIEDEMAN EFFECT, 70*A*.
WIRE :
drawing, backward pull, 106*A*.
drawing, formulae for, 13*A*.
drawing, heating up of metal, 172*A*.
drawing, history, 13*A*.
heat-treatment, 62*A*.
patenting, use of salt baths, 210*A*.
specification, British, 185*A*.
spring, properties, 71*A*.
WIRE (*contd.*)—
wrapping, use of non-magnetic steel, 33*A*.
WITKOWITZ WORKS, Talbot process, 103*A*.
WITTER PROCESS for forging shells, 13*A*.
WOOD, use for drawing dies, 106*A*.
WROUGHT IRON :
cadmium plated, corrosion in soils, 126*A*.
corrosion in soil, 110*P*., 126*A*.
WÜSTITE, crystal structure, 157*P*.

X-RAY DIFFRACTION, instruments used in, 152*A*.
X-RAY EXAMINATION :
lattice distortion, 152*A*.
metals, 152*A*., 153*A*.
use of lead intensifying screens, 221*A*.
X-RAYS, use for stress measurement, 68*A*.

YIELD STRENGTH, determination, 67*A*.

ZINC :
corrosion in chloride solutions, 226*A*.
corrosion in soil, 110*P*., 127*A*.
electrodeposition, 113*A*.
molten, effect on malleable cast iron, 181*A*.
oxide coatings, 114*A*.
ZINC COATINGS :
corrosion, 227*A*.
electrolytic, corrosion, 190*A*.
electrolytic, protective value, 192*A*.
replaced by paint coatings, 117*A*.
ZINC ORE, concentration, 89*A*.
ZIRCONIUM :
effect in cast iron, machinability, 148*A*.
effect in free-cutting steel, machinability, 148*A*.
effect in steel, machinability, 148*A*.
ZIRCONIUM ORE DEPOSITS, South America, 87*A*.

NAME INDEX.

AAMODT, B. J., acid steel melting, 104*A*.

AFANAS'EV, S., free-cutting steel, 51*A*.

AITCHISON, C. S., properties of stainless steel sheets, 146*A*.

AKIMOV, K., rolling of free-cutting steel, 59*A*.

ALLEN, C. J., heat-treated rails, 220*A*.

ALLEN, N. P., solubility of hydrogen in iron, 256*P*.

ALLEN, W., obituary notice, 492*P*.

ALMEN, J. O., stress determination in metals, 217*A*.

AMBLER, J. A., elected Associate, 4*P*.

AMOS, E., elected Associate, 4*P*.

ANDERSON, A. R., tensile tests, 25*A*.

ANDERSON, C. T., leaching of manganiferous iron ore, 194*A*.

ANDREW, J. H., rimming steel, 366*P*.

ANDREW, J. H., A. K. BOSE, G. A. GEACH and H. LEE :
Paper : "The Formation of Hair-Line Cracks. Part I," 193*P*. *Joint Discussion*, 244*P*. *Joint Correspondence*, 256*P*. *Authors' Reply*, 270*P*.

ANDREW, J. H., A. K. BOSE, H. LEE, and A. G. QUARRELL :
Paper : "The Formation of Hair-Line Cracks. Part II," 203*P*. *Joint Discussion*, 244*P*. *Joint Correspondence*, 256*P*. *Authors' Reply*, 270*P*.

ANDREW, J. H., H. LEE, and A. G. QUARRELL :
Paper : "The Determination of the Solubility of Hydrogen in Iron and Iron Alloys," 181*P*. *Joint Discussion*, 244*P*. *Joint Correspondence*, 256*P*. *Authors' Reply*, 270*P*.

ANDREWS, W., elected Member, 2*P*.

AREND, A. G., bullet-proof steel, 171*A*.

AREND, H., wear tests, 26*A*.

ARMISTEAD, W. H., determination of iron, 157*A*.

ARMSTRONG, E., prevention of rust on steel, 188*A*.

ARMSTRONG, G. R., elected Associate, 4*P*.

ARNOLD, E. A., electrographic analysis, 157*A*.

ARTHUR, J. T., elected Member, 2*P*.

ASH, W., rimming steel, 382*P*.

ASHCROFT, W., heat-treatment furnaces, 107*A*.

ASTON, J. L., elected Associate, 4*P*.

ATHEY, J. W., elected Member, 2*P*.

ATKIN, chilled rolls, 201*A*.

ATTWILL, W. H., water treatment to prevent corrosion, 189*A*.

AUER, G., air heaters for blast-furnaces, 133*A*.

AULER, E. P., effect of welding procedure on properties of butt-welded stainless steel, 66*A*.

AUSEL, W., corrosion of steel, 191*A*.

AVERSTEN, J., deseaming of billets, 23*A*.

AVERY, H. S., creep of chromium-nickel steel, 220*A*.

BABLIK, H. :
corrosion of galvanised vessels by pig food, 192*A*.
corrosion of zinc coatings, 227*A*.
galvanising, 181*A*.

BACKHAUS, K., individually driven rolls for roll tables, 60*A*.

BAGSHAWE, B. :
determination of sulphur and phosphorus in steel, 471*P*.
elected Member, 2*P*.

BAIER, S., electrotinning, 114*A*., 182*A*.

BAILEY, B. L., conversion of magnesite to periclase, 131*A*.

BAILEY, C. A., reclamation of lubricating oil, 210*A*.

BALDWIN, A. T., galvanising, 24*A*.

BALICKI, M., elected Member, 2*P*.

BALLARD, J. W., photometric instruments, 152*A*.

BANDEL, G. :
embrittlement of chromium steel, 71*A*.
scaling of heat-resistant steel, 17*A*.
scaling resistance of alloy steel, 63*A*.

BANFIELD, T. A. :
Paper : "Tests on the Corrosion of Buried Ferrous Metals." *See* HUDSON, J. C.

BARDENHEUER, P., high-frequency furnaces, 54*A*., 55*A*.

BARDILL, J. D., concentration of manganese ore, 88*A*.
BARHEINE, F., paper foundry patterns, 101*A*.
BARKER, L. B., contour measurement of wire-drawing dies, 141*A*.
BARLOW, T. E., alloying of cast iron, 134*A*.
BARNES, W., excavating machines for ore mines, 194*A*.
BARRACLOUGH, S.:
Paper: "The Influence of Tin on Alloy Steels." *See* BOLSOVER, G. R.
BARRETT, E. P., leaching of manganese carbonate ores, 41*A*.
BARRETT, H. N., JUN., magnesite ramming mixtures, 204*A*.
BARTLETT, C. W., production of springs, 13*A*.
BASSETT, J. B., microscopic examination of metals, 124*A*.
BASTOW, J., elected Associate, 4*P*.
BAUER, J. T., slag reaction in basic open-hearth practice, 204*A*.
BAUKLOH, W.:
effect of solids on decomposition of carbon monoxide and methane, 3*A*.
effect of thorium in cast iron, 121*A*.
refining of cast iron in carbon-monoxide/carbon-dioxide mixtures, 7*A*.
BAYLEY, W. S., mineral resources of New Jersey, 87*A*.
BECK, A. E., recovery of manganese from ore, 88*A*.
BECKET, F. M., obituary notice, 493*P*.
BEECH, A. S., mechanisation of foundries, 50*A*.
BEECHING, R., cavitation erosion of propellors, 37*A*.
BEEGHLY, H. F.:
determination of nitrogen in steel, 80*A*.
nails from ruins of St. Pierre, 80*A*., 154*A*.
BEHRENDT, G., desulphurisation of pig iron, 94*A*.
BEINERT, H., passivity of iron, 190*A*.
BELCHER, R., determination of sulphur and phosphorus in steel, 472*P*.
BELL, W., JUN., casting of anchors, 202*A*.
BENCOWITZ, I., welding flux for high-sulphur steel, 215*A*.
BENEDICKS, C.:
capillarity in grain boundaries of metals, 36*A*.
corrosion of Ovifak iron, 225*A*.
BENSON, L. E., quenching of chromium-nickel steel after tempering, 183*A*.
BERGMANN, W. W., ingot-mould stools, 56*A*., 206*A*.
BERK, A. A., intercrystalline cracking of boiler steel, 156*A*.
BERLIEN, G. B., heat treatment, 61*A*.
BERRIMAN, A. E., effect of contraction and stresses in welds, 109*A*.
BESSE, W., use of long-distance gas for firing reheating furnaces, 105*A*.
BEVAN, J. I., elected Member, 2*P*.
BEVERLEY, L. T., elected Associate, 4*P*.
BILL, A. B., malleable iron castings, 49*A*.
BINGHAM, J. W., obituary notice, 494*P*.
BINNIE, D.:
Paper: "An Ingot of Rimmed Steel Made by the Basic Open-Hearth Process," 283*P*. *Joint Discussion*, 363*P*. *Joint Correspondence*, 377*P*. *Author's Reply*, 384*P*.
BIRCH, R. E., blast-furnace refractories, 90*A*.
BIRDSALL, G. W., properties of forgings, 26*A*.
BISCHOF, F., carbon saturation in cast iron, 122*A*.
BISSELL, A. G., weldability tests, 19*A*., 67*A*.
BLACK, L. G., "Hardsteel" drills, 22*A*.
BLACKBURN, J., elected Associate, 4*P*.
BLAKISTON, J.:
moulding sands, 458*P*.
substitution of cast iron for steel castings, 167*A*.
BLASCHCZYK, G., isolation of iron carbide, 35*A*., 222*A*.
BLEAKNEY, H. H., Ac_1 range in nickel steel, 77*A*.
BLECKMANN, R., high-frequency furnaces, 55*A*.
BLOOM, F. S.:
forge furnaces, 139*A*.
reheating furnaces, 105*A*.
BLUM, W., lead plating, 24*A*.
BOGLE, J. C., hard chromium plating, 24*A*.
BOLLENRATH, F., determination of elastic constants, 35*A*.

BOLSOVER, G. R., and S. BARRACLOUGH :
Paper : "The Influence of Tin on Alloy Steels," 141*P*.
BONHOEFFER, K. F. :
activation of passive iron in nitric acid, 190*A*.
passivity of iron, 190*A*.
BOOT, P. J., core-binders, 459*A*.
BOOTE, E. M., obituary notice, 494*P*.
BOOTH, H., carbon blocks for blast furnaces, 162*A*.
BORSIG, F., corrosion of machine parts, 38*A*.
BOSE, A. K. :
Paper : "The Formation of Hair-Line Cracks." *See* ANDREW, J. H.
BOSWELL, A., elected Member, 2*P*.
BOTTENBERG, W., high-frequency furnaces, 54*A*.
BOWMAN, H. T., after-blow in Bessemer practice, 203*A*.
BOXALL, D. G., elected Associate, 4*P*.
BOYLES, A., undercooling of cast iron, 102*A*.
BRADLEY, J. N., linings for Sesci furnaces, 67*P*.
BRADSHAW, C. D., elected Member, 2*P*.
BRAIDWOOD, W. W., high-duty cast iron, 96*A*.
BRAILSFORD, F., magnetostriction in electrical sheets, 70*A*.
BRASHARES, C. A., refractories for electric furnaces, 90*A*.
BREITLING, K., gasification in small producers, 196*A*.
BREMER, E., casting of trench mortar bodies, 100*A*.
BREMER, F., phosphate coatings on piston rings, 180*A*.
BRICKWEDDE, F. C., platinum resistance thermometers, 60*A*.
BRINKMANN, G. :
core binders, 10*A*.
short-cycle annealing of malleable cast iron, 98*A*.
BROWN, C. E., measurement of atmospheric pollution, 164*A*.
BROWN, J. S., fatigue of crankshafts, 184*A*.
BROWN, R. H., cathodic protection of metals, 124*A*.
BROWN, W. T., by-product coking practice, 44*A*.
BRUCHHAUSEN, C., silicon-carbide bricks, 195*A*.
BRUCKNER, W. H., weldability of steel, 19*A*.
BRYTCZUK, W. L., electrolytic polishing, 186*A*.
BUCHANAN, W. Y., tests of moulding sand, 48*A*.
BUCHHOLTZ, H. :
corrosion cracking of steel, 37*A*.
tests on boiler tubes, 28*A*.
BUELL, W. C., JUN., mixer practice, 206*A*.
BULAVKIN, A., gas content of liquid steel, 52*A*.
BUNGARDT, W., effect of vanadium on scaling of steel, 17*A*., 214*A*.
BURTON, H. H., hydrogen evolution and hair-line crack formation, 244*P*.
BUSCH, H., failure of welded bridges, 21*A*.
BUTLER, H., obituary notice, 495*P*.

CALHOUN, W. A., concentration of manganese-bearing ore, 88*A*.
CALLAGHAN, E., tungsten in Idaho, 87*A*.
CAMPBELL, G., defects in steel, 208*A*.
CAMPBELL, J. D. :
electrical instruments for steel industry, 16*A*.
strip mill of Carnegie-Illinois Steel Corp., 15*A*.
CAMPBELL, T. C., low-alloy steel for aircraft construction, 221*A*.
CAMPBELL, W. E., statistical control in corrosion studies, 156*A*.
CASE, R. W., centrifugal casting of guns, 49*A*.
CAULFIELD, T. H., elected Member, 2*P*.
CENTER, E. J., determination of phosphorus in iron ore, 158*A*.
CHARTERIS, W. F., elected Member, 2*P*.
CHASE, H. :
cold-press work, 13*A*.
forging of tractor parts, 172*A*.
heat treatment of cold-headed products, 18*A*.
phosphate coatings on steel, 114*A*.
plant of Lalanse and Grosjean Mfg. Co., 209*A*.
CHESTERS, J. H. :
chromite from Shetland, 89*A*.
linings for electric furnaces, 42*A*.
refractories for open-hearth furnaces, 162*A*.
CHIPMAN, J., carbon-oxygen equilibrium in liquid iron, 205*A*.
CHISWIK, H. H., corrosion-resistance of welds, 215*A*.

CHRISTENSEN, A. L., intensifying screens for radiographs, 76*A*.
CHUBB, W. F., chilled-iron wheels, 167*A*.
CHUYKO, N., sound ingots, 56*A*.
CHWORINOFF, N., solidification of castings, 203*A*.
CLARK, D., steel castings, 98*A*.
CLARKE, L., moulding a marine-engine bed-plate, 49*A*.
CLAUSS, J. A., fuel-oil supply system of Great Lakes Steel Corporation, 206*A*.
CLAUSSEN, G. E. :
fusibility tests for determining weldability, 66*A*.
tests of welds, 145*A*.
CLEAVES, H. E., high-purity iron, 183*A*.
CLEVELAND, C., forging shop of Delaware, Lackawanna and Western Railroad, 58*A*.
CLUBLEY, G. H., elected Member, 2*P*.
COLBECK, E. W., corrosion of water-circulating systems, 103*P*.
COLLACOTT, R. A., corrosion resistance of chromium-nickel steel, 126*A*.
COLLINS, A., coke and pig-iron manufacture, 93*A*.
COMSTOCK, G. F., effect of deoxidisers on forging steel, 219*A*.
CONTRACTOR, G. P., weldability of alloy steel, 109*A*.
COOK, E., creep of chromium-nickel steel, 220*A*.
COOME, D. E., elected Member, 2*P*.
CORNELIUS, H. :
effect of composition on properties of welded facings, 20*A*.
effect of vanadium on scaling of steel, 17*A*., 214*A*.
ferrous materials used in aircraft, 74*A*.
COWLIN, F. J., properties of steel at high temperatures, 149*A*.
COYNE, T. D., fatigue of welds at low temperatures, 218*A*.
CRAFTS, W., carbides in low-chromium steel, 222*A*.
CRAIG, J. W., basic linings for open-hearth furnaces, 42*A*.
CROWTHER, J., elected Member, 2*P*.
CURRIE, E. M., cast iron crankshafts, 134*A*.
CURTIS, F. W., induction hardening of tools, 212*A*.
CURTIS, J. A., colorimetric analysis, 82*A*.
DAASCH, H. L., notch sensitivity of welds, 21*A*.
DANIELS, F. C. T., elected Member, 2*P*.
DANNÖHL, W. :
iron-aluminium-nickel alloys, 78*A*., 224*A*.
iron-aluminium-nickel diagram, 77*A*.
DARRAH, W. A., ferro-alloy production in Brazil, 199*A*.
DARTON, N. H., anthracite in Pennsylvania, 1*A*.
DATTISMAN, E. J., JUN., co-operation between open-hearth and rolling-mill departments, 206*A*.
DAVEY, H. J., obituary notice, 495*P*.
DAVIES, E., coke and pig-iron manufacture, 93*A*.
DAVIES, L., elected Member, 2*P*.
DAVIS, H. W., substitutes for cobalt, 185*A*.
DAVIS, J. D. :
coking tests of coal, 44*A*.
swelling of coal, 165*A*.
DAVISON, D. W., titanium carbides and nitrides, 482*P*.
DAWSON, W. J., moulding sands, 455*P*.
DEAN, R. S., recovery of manganese from ores, 88*A*.
DEARDEN, J., properties of welded joints, 108*A*.
DE FOREST, A. V. :
precision springs, 71*A*.
tensile tests, 25*A*.
DEHLINGER, U., intermetallic phases, 153*A*.
DE KEYSER, W., elected Member, 2*P*.
DE LANGE, S. G. P., suitability of mild steel for arc welding, 110*A*.
DELMONTE, J., steel moulds for plastics, 172*A*.
DE LORENZI, O., firing of boilers with blast-furnace gas and coke breeze, 163*A*.
DENISON, I. A., corrosion of metals in soils, 127*A*.
DESCH, C. H., rimming steel, 369*P*.
DESCHAMPS, J. L. G., obituary notice, 496*P*.
DESMOND, J., graphite crucibles, 74*A*.
DESMOND, J. K., steels for plastic moulds, 122*A*.
DEVANEY, F. D., concentration of manganese ore, 88*A*.
DICHGANS, H., costs and prices in iron industry, 47*A*.

DICKENS, P., recovery of iodine and potassium chloride from flue dust, 199*A*.
DICKIE, H. A., rimming steel, 366*P*.
DIEPSCHLAG, E. :
centrifugal casting, 10*A*.
cupola practice, 47*A*.
DINSDALE, C., repair of coke ovens, 5*A*.
DISSTON, H. C., steels for plastic moulds, 122*A*.
DITTMAR, H., hydraulic plants for Bessemer works, 57*A*.
DOANE, F. B., Magnaflux method of detecting cracks, 68*A*.
DODD, F. G., elected Member, 2*P*.
DONALDSON, J. W. :
carbon steels, 216*A*.
non-destructive tests of metals, 67*A*.
DORR, J. V. N., tungsten in California, 1*A*.
DRECHSLER, W., hardening of steel, 214*A*.
DROSSBACH, P., arc furnaces, 138*A*.
DRUMM, J. H., JUN., steel plant in Brazil, 11*A*.
DRYUPIN, A., blowing-out of blast-furnaces, 45*A*.
DUCKWITZ, C. A., tests on boiler tubes, 28*A*.
DUFFEK, V., phosphate coatings, 179*A*.
DUFTY, N. F. :
refractory materials for arc furnaces, 43*A*.
slag/metal equilibrium in arc furnaces, 56*A*.
DURRANS, J., elected Member, 2*P*.
DURRANS, P. H., elected Member, 3*P*.
DURYEE, L. M., drying moulding sand with infra-red lamps, 101*A*.
DWYER, P. :
casting plough parts and pipe fittings, 134*A*.
core blowers, 101*A*.
moulding of iron castings, 202*A*.
plant of American Naval-Yard foundry, 135*A*.
DYER, R. C., porosity in castings, 49*A*.
DYER, W. E. S., boiler plant of Algoma Steel Corporation, 3*A*.

EADY, M., foundry practice, 95*A*.
EASH, J. T. :
effect of ladle additions on cast iron, 101*A*.
EASH, J. T. (*contd.*)—
moisture control and preheating of cupola blast, 97*A*.
structure of nickel steel and nickel cast iron, 223*A*.
EBERLE, F., copper-bearing steel, 150*A*.
EDSALL, H. L., salt-bath hardening furnaces, 107*A*.
EDSON, A., hardness of weld metal, 175*A*.
EDWARDS, J. D., oxide coatings, 114*A*.
EICHHOLZ, W., desulphurisation of pig iron, 94*A*.
EICHINGER, A., temperature rise in wire drawing, 173*A*.
EILENDER, W., corrosion of steel, 191*A*.
EISENSTECKEN, F., potential changes of iron-zinc couples, 38*A*.
ELCOCK, E. W., elected Member, 3*P*.
ELLABY, C. H., protective coatings, 182*A*.
ELLINGER, G. A. :
weldability tests, 67*A*.
weldability tests of steel, 19*A*.
ELLIS, O. W., forgeability of metals, 140*A*.
ELLIS, R. P. P., elected Associate, 4*P*.
ELVEY, L. E., sharpening of drill steel, 212*A*.
EMDE, G., moulding sands, 9*A*.
EMERICK, H. B., duplex process, 137*A*., 204*A*.
ENDELL, J., clay substance in moulding sand, 100*A*.
ENDELL, K., clay substance in moulding sand, 100*A*.
ENGEL, A. L. :
grinding of carnotite ore, 194*A*.
ore-dressing, 88*A*.
ENGELBERT, U., refining of cast iron in carbon-monoxide/carbon-dioxide mixtures, 7*A*.
ENZIAN, G. H., nails from ruins of St. Pierre, 80*A*., 154*A*.
ESCHER, K., wear of cast iron, 219*A*.
ESS, T. J. :
plant of Atlantic Steel Co., 169*A*.
plant of Copperweld Steel Co., 203*A*.
plant of Dominion Foundries and Steel, Ltd., 137*A*.
plant of Steel Company of Canada, Ltd., 137*A*.
ESSER, H. :
effect of temperature on creep strength, 27*A*.
wear tests, 26*A*.
EVANS, E. C., fuel economy in iron industry, 91*A*.

EVANS, G. S.:
desulphurisation of cast iron, 98*A*.
desulphurisation of pig iron, 133*A*.
EVANS, N. L., elected Member, 3*P*.
EVANS, R. L., leaching of manganese carbonate ores, 41*A*.
EVANS, U. R.:
Paper: "A Study of Some Soluble Inhibitors, with Special Reference to Heat Transfer with Water-Line Attack." *See* THORNHILL, R. S.
corrosion of iron and zinc in chloride solutions, 226*A*.
hair-line crack formation, 257*P*.
oxidation reactions, 175*P*.
EVERETT, L. E., defects in castings, 101*A*.
EYRE, A. W., elected Associate, 4*P*.

FABER, H., phosphatising before cold-work, 180*A*.
FARABEE, R. L., elected Member, 3*P*.
FARLOW, V. R., induction hardening, 174*A*.
FASTOVSKIY, B., Bessemer steel, 220*A*.
FAUST, G. T., magnesia-silica system, 196*A*.
FEIGENBAUM, S., duplex process, 137*A*., 204*A*.
FELLOWS, J. A., creep of chromium-nickel-steel, 220*A*.
FERON, H., elected Member, 3*P*.
FINE, M. M.:
concentration of maganese-bearing ore, 131*A*., 194*A*.
concentration of manganese ore, 88*A*.
concentration of manganiferous iron ore, 88*A*.
concentration of wad ore, 195*A*.
FISHER, H. C., rammed linings for electric furnaces, 43*A*.
FISHER, R. B.:
concentration of manganese-bearing ore, 131*A*.
concentration of wad ore, 195*A*.
FITTERER, G. R., gases in acid open-hearth steel, 206*A*.
FLETCHER, T., patching of Sesci furnace linings, 66*P*.
FOLKNER, M. H., Nicarb process of case-hardening, 63*A*.
FORSBERG, H. J. U., obituary notice, 496*P*.
FOSTER, B., elected Member, 3*P*.
FOUNTAIN, L. L., electric driving of rolling mills, 210*A*.
FOX, A. L., recovery of manganese from ores, 88*A*.
FOXWELL, G. E., carbon deposition in coke-oven roofs, 197*A*.
FRICKE, R.:
equilibrium between iron, iron oxide, hydrogen and water, 225*A*.
lattice distortion, 152*A*.
FRIES, C., JUN., tin in New Mexico, 1*A*.
FRY, Miss E. B., elected Member, 3*P*.
FUCHS, W., coking pressures, 164*A*.
FULLER, E., sintering plant of Great Lakes Steel Corporation, 195*A*.
FULTON, J. S., effect of coke rate on gas composition in blast furnaces, 45*A*.
FUSCO, A. J., cadmium plating, 113*A*.

GALL, D. C., elected Member, 3*P*.
GALL, J., gasification in small producers, 196*A*.
GARRETT, G. B., obituary notice, 497*P*.
GARZULY-JANKE, R., corrosion of galvanised vessels by pig food, 192*A*.
GASE, D. C., elected Member, 3*P*.
GEACH, G. A.:
Paper: "The Formation of Hair-Line Cracks." *See* ANDREW, J. H.
GEBAUER, K., chromium coatings, 177*A*.
GEHM, H. W., utilisation of waste pickling liquor, 112*A*.
GELLER, W.:
corrosion of steel, 191*A*.
resistor furnaces for steel making, 11*A*.
GIMMY, A., degree of saturation in cast iron, 215*A*.
GINSBERG, S. I., leaching of manganese carbonate ores, 41*A*.
GLASS, D. K., obituary notice, 498*P*.
GNIDA, E., use of coke-oven gas in open-hearth furnaces, 207*A*.
GODDARD, E. N., manganese in Montana, 1*A*.
GOLD, J. D., use of blown metal in basic open-hearth practice, 206*A*.
GOLDEN, J. J., pig-ore process, 205*A*.
GOL'DMAN, V., manufacture of chromium-nickel steel from scrap, 54*A*.

GOLDSCHMIDT, H. J.:
Paper : "The Crystal Structures of Fe, FeO and Fe_3O_4 and their interrelations," 157*P*. *Correspondence*, 175*P*. *Author's Reply*, 177*P*.
GOODISON, W. S., obituary notice, 498*P*.
GOODMAN, W., determination of copper and nickel in steel, 158*A*.
GÖRISSEN, J., desulphurisation of iron, 52*A*.
GOSS, J. H., permanent magnets, 148*A*.
GOTTA, A., resistance of chromium-nickel steel to nitric acid, 192*A*.
GÖTZL, F., galvanising, 181*A*.
GRAHAM, A. K., salt spray tests of oxide coatings, 154*A*.
GRAPER, L. G., sulphite-treated steel, 170*A*.
GRAY, A. G., lead plating, 24*A*.
GRDINA, YU., flame hardening of rails, 62*A*.
GREAVES, E. I., elected Associate, 4*P*.
GREEN, A. T., carbon blocks for blast-furnaces, 162*A*.
GREEN, J. R., Brown system of fuel control, 206*A*.
GREENAWALT, J. E., open-hearth sinter, 206*A*.
GREGG, A. W.:
production of steel castings, 135*A*.
side-blown converters, 99*A*.
GREGG, J. L., accelerated atmospheric corrosion test, 39*A*.
GREGORY, E.:
hydrogen solubility and hair-line crack formation, 248*P*.
limits of accuracy in sulphur determinations, 469*P*.
GRIFFEN, J., cleaning of coal, 5*A*.
GRIFFITHS, E., thermal conductivity of materials, 90*A*.
GRIMSHAW, L. C., heat treatment of molybdenum high-speed steel, 16*A*.
GROSSMANN, M. A., hardenability of steel, 219*A*.
GROSVENOR, A. W., Ac_1 range in nickel steel, 77*A*.
GROVE, H. A., stainless steel scrap, 12*A*.
GRUCA, E. P., impact strength of spot welds, 65*A*.
GRÜN, R., blast-furnace slag cement, 46*A*., 199*A*.
GRÜTZMACHER, F. E., elimination of dust and noise in foundries, 136*A*.
GUDGEON, W., moulding of iron castings, 203*A*.
GULBRANSEN, E. A., oxide films on iron, 127*A*.
GURRY, R. W., solubility of carbon in gamma iron, 186*A*.
GUTHMANN, K.:
ore-preparation plants, 89*A*.
pigments for temperature measurement, 142*A*.
preparation of iron ore, 131*A*.
GUTHRIE, R. G., nitriding tank parts, 63*A*.

HAASE, L. W., effect of biological processes on corrosion, 188*A*.
HALL, F. W., elected Associate, 4*P*.
HALL, G., core sand mixtures, 10*A*.
HALL, N., surface area of stampings, 176*A*.
HALL, W. H., elected Associate, 4*P*.
HALLS, E. E.:
analytical control of nickel-plating solutions, 228*A*.
thickness measurement of nickel coatings, 177*A*.
HALVORSON, O. A., corrosion of bolts, 126*A*.
HAMER, P., corrosion of water-circulating systems, 103*P*.
HAMILTON, O. H., oxidation and tarnishing of metals, 224*A*.
HAMMOND, A. F., production of cast-iron cylinder cover, 168*A*.
HAMNETT, G. J., elected Member, 3*P*.
HAMPTON, G. T., elected Member, 3*P*.
HANEMANN, H., signs for heterogeneous equilibria, 153*A*.
HANLEY, H. R., electrolytic cleaning of metals, 112*A*.
HARBORD, F. W., obituary notice, 489*P*.
HARKER, D., surface replicas for use with electron microscope, 221*A*.
HARRINGTON, L. C., drying of lignite, 197*A*.
HARRIS, P., elected Associate, 4*P*.
HARTLEY, A., elected Associate, 4*P*.
HARTLEY, A. L., flame hardening, 213*A*.
HASNER, L., corrosion tests by potential measurements, 224*A*.
HATFIELD, W. H.:
alloy steels, 73*A*.
damping capacity of engineering materials, 70*A*.
hair-line crack formation, 249*P*.

HATFIELD, W. H. (*contd.*)—
limits of accuracy in sulphur determinations, 468*P*.
rimming steel, 363*P*., 374*P*.
standard methods of analysis, 476*P*.
HAUTTMANN, H., notched-bar bend tests, 25*A*.
HAYDEN, H., planning and technical department for foundry, 47*A*.
HAYWOOD, C., elected Member, 3*P*.
HAZLETT, T. H., stretch forming of sheets, 140*A*.
HEEREN, M. H., corrosion testing machine, 224*A*.
HEINRICH, H., effect of phosphorus in cast steel, 122*A*.
HELLBRÜGGE, J., effect of solids on decomposition of carbon monoxide and methane, 3*A*.
HEMMING, F. J., obituary notice, 498*P*.
HENGEMÜHLE, W., scatter in hardness tests, 120*A*.
HENRY, O. H., fatigue of welds at low-temperatures, 218*A*.
HERASYMENKO, P., slag-metal equilibria, 171*A*.
HERRES, S. A., control of cupola blast, 200*A*.
HERRINGTON, C. F., pulverised coal, 132*A*.
HERTY, C. H., JUN., use of soft ore in open-hearth practice, 206*A*.
HERZIG, A. J., hardenability of steel, 69*A*.
HESELGRAVE, J. L., elected Associate, 4*P*.
HESS, F. O., radiant-cup burners for heat-treatment furnaces, 61*A*.
HESS, W. F., spot welding of high-tensile steel, 144*A*., 215*A*.
HEUMANN, T., iron/iron-sulphide/-calcium-sulphide system, 36*A*.
HEWETT, D. F., manganese in Arkansas, 87*A*.
HEYES, J. :
spectrum analysis of inclusions, 81*A*.
surface quality of materials, 74*A*.
HEYN, H. M., heat treatment of wire, 62*A*.
HICKMAN, M. J., thermal conductivity of materials, 90*A*.
HICKSON, E. F., paint coatings, 117*A*.
HIEGEL, J. M., high-purity iron, 183*A*.
HINDSON, R. D., tin in high-sulphur steel, 206*A*.
HINMAN, C. W. :
drawing and forming dies, 106*A*.
redrawing of shells, 140*A*.
HOAR, T. P., hydrogen in steel, 266*P*.
HODGSON, G. H., elected Member, 3*P*.
HOGE, H. J., platinum resistance thermometers, 60*A*.
HÖGEL, H., phosphatising, 179*A*.
HOLDEN, A. H., protective atmospheres in hardening furnaces, 107*A*.
HOLDEN, H. A. :
Paper : "Tests on the Corrosion of Buried Ferrous Metals." *See* HUDSON, J. C.
HOLLAND, E., feeding of malleable iron castings, 48*A*.
HOLLINDERBÄUMER, W., converter practice for steel castings, 9*A*.
HOLM, V. C. F., elimination of oxide films on heating in vacuum, 213*A*.
HOLMES, C. R., properties of coke, 198*A*.
HOLT, G. J., mining of Minnesota iron ore, 194*A*.
HOLTMANN, W., properties of alloy steel, 149*A*.
HONEYMAN, A. J. K., hair-line crack formation, 261*P*.
HÖNIG, H., resistor furnaces for steel making, 11*A*.
HOOK, C. R., efficiency in steelworks production, 204*A*.
HOSKING, N., steel foundry practice, 98*A*.
HOTOP, W., magnets from sintered iron-nickel-aluminium alloys, 46*A*.
HOUDREMONT, E. :
isolation of iron carbide, 35*A*., 222*A*.
tensile properties of steels annealed in hydrogen, 30*A*.
HOWARD, E. J. L., properties of cast iron, 31*A*.
HOWARD, H. C., density and porosity of carbonaceous materials, 93*A*.
HOWARD, J. M., elected Member, 3*P*.
HOWARD, W., elected Member, 3*P*.
HOWAT, D. D., electrostatic precipitation of gases, 5*A*.
HOWDEN, P., elected Member, 3*P*.
HOWIE, T. W., chromite from Shetland, 89*A*.
HOWLAND, A. L., chromite in Montana, 1*A*.
HOWSON, H. O., hair-line crack formation, 264*P*.
HOYT, S. L., stainless clad steel, 113*A*.
HUDDLE, A. U., hair-line crack formation, 262*P*.

HUDSON, J. C., T. A. BANFIELD and H. A. HOLDEN :
Paper : "Tests on the Corrosion of Buried Ferrous Metals," 107*P*. *Correspondence*, 127*P*. *Authors' Reply*, 129*P*.
HUGILL, W., product of reaction between silica brick and slag, 89*A*.
HUME-ROTHERY, W., G. V. RAYNOR and A. T. LITTLE :
Paper : "On the Carbide and Nitride Particles in Titanium Steels." *Further Discussion*, 481*P*. *Authors' Reply*, 486*P*.
HUNTER, M. A., reducing nickel content of nickel-steel castings, 33*A*.
HURST, H. M., elected Associate, 4*P*.
HURST, T. L., slagging of refractories, 162*A*.
HUTSON, A. E., pyrometry, 60*A*.
HUTTL, J. B., manganese in Montana, 1*A*.
HYSLOP, J. F., slagging of refractories, 196*A*.

IMHOFF, W. G., galvanising, 114*A*.
IPSEN, C. L., electric heat-treatment furnaces, 18*A*., 61*A*.
ISENBURGER, H. R., lead screens for X-rays, 221*A*.

JACKSON, A. :
Paper : "The Linings of Large Basic Open-Hearth Tilting Furnaces," 9*P*. *Correspondence*, 16*P*. *Authors' Reply*, 19*P*.
JAENICHEN, E., patenting of wire in salt baths, 210*A*.
JAY, A. H., chromite from Shetland, 89*A*.
JELLINGHAUS, W., manganese steel for magnets, 27*A*., 149*A*.
JENKINS, C. G., elected Associate, 4*P*.
JENKINS, I., bright annealing of steel, 64*A*.
JENNINGS, C. J., electric welding machines, 214*A*.
JOHANSEN, F. C., detection of flaws in axles, 183*A*.
JOHNS, R. L., elected Associate, 4*P*.
JOHNSON, H. W., effect of coke properties on blast-furnace practice, 7*A*.
JOHNSON, P. H., tinplating, 115*A*.
JOHNSON, R. A. C., elected Member, 3*P*.
JOHNSTON, T. L., concentration of manganese-bearing ore, 88*A*., 131*A*., 194*A*.
JONES, D. G., elected Associate, 4*P*.
JONES, E., elected Associate, 4*P*.
JONES, J. H. :
coking coals of Durham, 4*A*.
national emergency steel, 216*A*.
JONES, V. W. :
briquetting of soft ore, 206*A*.
removal of enamel from scrap, 206*A*.
JOSEPH, T. L. :
concentration and smelting of iron ores in United States, 2*A*.
desulphurisation of iron in open-hearth process, 170*A*.
effect of manganese on desulphurising power of calcium silicates, 138*A*.
rotating induction furnace, 104*A*.
JOY, J. D., elected Member, 3*P*.
JURETZEK, H., alloy steel castings, 220*A*.

KAIN, C. H. :
production of steel castings, 135*A*.
synthetic moulding sand, 462*P*.
KAISER, H. F., intensifying screens for radiographs, 76*A*.
KALISCHER, P. R., powder metallurgy, 8*A*.
KASSEM, M. A., reduction of iron ore with hydrogen, 200*A*.
KATSEN, L., gas content of liquid steel, 52*A*.
KATZEN, L. G., gases evolved from liquid steel, 80*A*.
KAUFFELD, G. H., lubrication systems for strip mills, 14*A*.
KAYSER, J. A., refractories for malleable-iron furnaces, 90*A*.
KAYSER, J. F., magnetic powder method of crack detection, 218*A*.
KEELEY, L. F., ingot moulds for tool steel, 56*A*.
KEIL, F., ultilisation of blast-furnace slag, 94*A*.
KELLEY, F. C., powder metallurgy, 46*A*.
KELLS, R. P., heat treatment of molybdenum high-speed steel, 16*A*.
KEMMER, F. R., ferro-alloy manufacture in Australia, 95*A*.
KEMPF, H., analysis of pig iron, 82*A*.

KEMSLEY, C. G., alloy steels for rock drills, 73*A*.
KENTIS, G., slitting mills, 15*A*.
KENYON, A. F., electric driving of rolling mills, 14*A*.
KERLIE, W. L., rimming steel, 377*P*.
KESSNER, H., effect of nitrogen in chromium-nickel steel, 121*A*.
KIESSLER, H., effect of elements on the temper brittleness and hot brittleness of structural steel, 32*A*.
KING, C. D., use of scrap and pig iron in open-hearth process, 169*A*.
KING, J., moulding of cast iron cylinder cover, 168*A*.
KINNAIRD, D. W., case hardening of steel, 143*A*.
KIRCHBERG, H., microstructure of iron ore, 76*A*.
KITCHING, E. G., elected Associate, 4*P*.
KLINGER, P.:
determination of alloy additions in steel, 83*A*.
isolation of iron carbide, 35*A*., 222*A*.
KNIPP, E., moulding sands, 9*A*.
KOCH, W., determination of alloy additions in steel, 83*A*.
KOEBEL, N. K., controlled atmospheres, 211*A*.
KOOTZ, T., nitrogen absorption by iron alloys, 30*A*.
KOPAJA, L., cost analysis in steel works, 11*A*.
KOPP, H.:
cupola practice, 200*A*.
phosphatising before cold-work, 180*A*.
KORPIUN, J., corrosion resistance of electrogalvanised coatings, 192*A*.
KOSHIK, A., manufacture of chromium-nickel steel from scrap, 54*A*.
KOSTER, J., substitutes for cobalt, 185*A*.
KOTH, A., drying of lignite, 197*A*.
KRÄCHTER, H.:
basic Bessemer process, 103*A*.
control of basic Bessemer process, 204*A*.
KRANER, H. M., wear of blast-furnace linings, 162*A*.
KRATH, E., determination of alloy additions in steel, 83*A*.
KRAUSE, H., coating of stainless steel, 180*A*.
KRAUSE, R., phosphatising, 178*A*.
KREIM, J., case-hardening of chromium-manganese steel, 19*A*.
KRICHEL, M., production of micrographs of cast iron, 124*A*.
KRISCH, A., properties of steel, 26*A*.
KROENIG, W. O., pickling of steel, 176*A*.
KRÜGER, L., foamed blast-furnace slag, 7*A*.
KRYNITSKY, A. I., elastic properties of alloy cast iron, 31*A*.
KUDICKE, K., cost analysis in steel works, 11*A*.
KULP, R. K., woody fracture in steel, 35*A*.

LAIDLER, G., elimination of vibrations in drop-hammers, 57*A*.
LAMB, F. D.:
concentration of flue dust, 166*A*.
concentration of manganese nodules, 88*A*.
LAND, G. W., determination of fusain in coal, 158*A*.
LANDAU, R., corrosion of binary alloys, 125*A*.
LARDGE, H. E., butt-welding of high-speed steel tips to mild steel, 145*A*.
LARICHEV, W., chromium-molybdenum-vanadium steel, 30*A*.
LARSON, L. J., metal transfer in arc welding, 65*A*.
LASKY, S. G., manganese in New Mexico, 1*A*.
LAWRENCE, H., weldability of steel, 109*A*., 66*A*.
LECKIE, A. H., dust catchers for gas producers, 6*A*.
LEDING, M. J., ignition rectifiers for motors, 141*A*.
LEE, H.:
Paper: "The Determination of the Solubility of Hydrogen in Iron and Iron Alloys." *See* ANDREW, J. H.
Paper: "The Formation of Hair-Line Cracks." *See* ANDREW, J. H.
rimming steel, 383*P*.
LEHMANN, H., clay substance in moulding sand, 100*A*.
LEMM, H. P., wide strip mills, 59*A*., 211*A*.
LEMMON, D. M.:
tungsten in California, 1*A*.
tungsten in Idaho, 87*A*.

LEMON, F. A., and H. O'NEILL :
Paper : "The Production in Rotary Furnaces of Steel for Castings," 53*P*. *Appendix A*. A Patching Process for Sesci Furnace Linings. By T. FLETCHER, 66*P*. *Appendix B*. Tests on Refractory Lining Materials. By J. N. BRADLEY, 67*P*. *Correspondence*, 71*P*. *Authors' Reply*, 72*P*.
LENDL, A. E., rolling mill practice, 141*A*.
LENZ, G. P., JUN., testing terms and methods, 67*A*.
LETENDRE, G., elected Member, 3*P*.
LEUTWILER, R. W., JUN., effect of preheating temperature on shrinkage stresses in welded plates, 145*A*.
LEWIS, K. B., history of wire drawing, 13*A*.
LIBSCH, J., iron powders, 95*A*.
LICHY, C. M., production of shell steel, 11*A*.
LIFSHITS, S., defects in steel, 53*A*.
LINDEMUTH, L. B., open-hearth practice in Australia, 206*A*.
LINDSAY, R. I., elected Associate, 4*P*.
LINDSAY, R. W., graphitisation of cast iron, 102*A*.
LINFORD, A., pyrometry, 60*A*.
LINLEY, A., substitute high-speed steels, 73*A*.
LISTON, R., elected Associate, 4*P*.
LLOYD, G. C., obituary notice, 499*P*.
LOACH, G. O., cupola practice, 8*A*.
LOCKE, F. A., controlled atmospheres, 61*A*.
LÖFQUIST, H., corrosion of Ovifak iron, 225*A*.
LOGAN, K. H., soil corrosion, 38*A*., 126*A*.
LOHRER, W., equilibrium between iron, iron oxide, hydrogen and water, 225*A*.
LOIB, F., embrittlement of chromium steel at high temperatures, 29*A*.
LONGDEN, E., cupola charges, 134*A*.
LONGENECKER, C., plant of Algoma Steel Corp., 11*A*.
LONGWELL, J. R. :
carbide dies for drawing special shapes, 13*A*.
carbide drawing dies, 141*A*.
LORD, W. M., core binders, 461*P*.
LORIG, C. H. :
control of cupola blast, 200*A*.
effect of hydrogen in malleablising process, 167*A*.
undercooling of cast iron, 102*A*.
LOSHCHILOV, S., Bessemer steel, 220*A*.
LOUGHREY, D. R., Bessemer converter plant, 169*A*.
LOUX, J. H., Witter shell-forging process, 13*A*.
LOVERING, T. S., tungsten in Colorado, 1*A*.
LUCKIE, J. B., water cooling of open-hearth furnaces, 104*A*.
LUEG, W. :
backward pull in wire drawing, 106*A*.
effect of tension during cold-rolling of strip, 15*A*.
surface quality of materials, 74*A*.
temperature rise in wire drawing, 173*A*.
LUMPKIN, L. B., temperature control in chromium plating, 177*A*.
LUSTMAN, B., film formation on metals, 79*A*.
LYNAM, T. R., chromite from Shetland, 89*A*.

MCADAM, D. J., JUN. :
effect of stresses on fatigue, 184*A*.
elastic properties of metals, 119*A*.
technical cohesive strength of metals, 119*A*.
technical cohesive strength and yield strength of metals, 216*A*.
MCCAFFERY, P., X-ray examination of castings, 153*A*.
MCCARTHY, R. H., hot-quenching of high-speed steel, 76*A*.
MCCARTNEY, J. T., swelling of coal, 165*A*.
MACCONOCHIE, A. F. :
abrasive disc cutting, 112*A*.
effect of hot and cold work on steel, 26*A*.
flow of metal in forging, 13*A*.
forge furnaces, 105*A*., 139*A*.
forging of crankshafts, 13*A*.
forging practice, 140*A*.
induction heating, 107*A*.
production of bushes and gears from powdered iron, 46*A*.
resistance heating of forgings, 209*A*.
upset-forging, 173*A*.
MCDONALD, J. H., use of Chrom-X in steelmaking, 56*A*.
MCELWEE, R. G., alloying of cast iron, 134*A*.

MacGregor, C. W., tensile tests, 25*A*.
Machu, W. :
copper coatings, 181*A*.
effect of electric current on acid attack on iron, 226*A*.
phosphatising, 177*A*.
pickling of steel in presence of inhibitors, 23*A*.
McKimm, P. J. :
open-hearth practice, 52*A*., 207*A*.
open-hearth process, 103*A*.
MacKinney, J. J., Shotweld process of welding stainless steel, 110*A*.
McLaren, A. W., elected Member, 3*P*.
McLean, H. M., elected Member, 3*P*.
McLoughlin, T. J., organisation of fuel department, 163*A*.
Macnair, P. M., rimming steel, 370*P*.
McNeil, I., elected Associate, 4*P*.
McQuaid, H. W., properties of carbon and low-alloy steels, 117*A*.
Mages, M., Magnaflux method of detecting cracks, 68*A*.
Magrath, J. G., flame hardening, 143*A*.
Maier, C. G., sponge chromium, 131*A*.
Mailänder, R., weldability of high-tensile steel, 20*A*.
Mantel, W., effect of silicon in structural steel, 73*A*.
Manterfield, D., determination of sulphur and phosphorus in steel, 474*P*.
Marin, J., creep of metals, 149*A*.
Marquand, H. S., welding of stainless steel, 110*A*., 145*A*.
Martin, G., stress measurement by X-rays, 68*A*.
Martindale, R. G., magnetostriction in electrical sheets, 70*A*.
Masari, S. C., graphitisation of cast iron, 102*A*.
Mason, B. H., awarded Carnegie Research Grant, 2*P*.
Mason, H., cleaning of castings, 136*A*.
Mathers, F. C., tinplating, 115*A*.
Mathieu, K., transformation curves in cases of restricted diffusion, 77*A*.
Matis, H. A., impact strength of spot-welds, 65*A*.
Matthews, S., elected Member, 3*P*.
Maurer, E., effect of elements on temper brittleness and hot-brittleness of structural steel, 32*A*.
Mawhinney, M. H. :
quenching of steel, 19*A*.
reheating furnaces, 209*A*.
Mebs, R. W., elastic properties of metals, 119*A*.
Mehl, F., recrystallisation of silicon ferrite, 223*A*.
Mehl, R. F., decomposition of austenite, 223*A*.
Meierling, H., effect of thorium in cast iron, 121*A*.
Merchant, H. J., awarded Carnegie Research Grant, 2*P*.
Merritt, H. E., elected Member, 3*P*.
Metcalfe, N., macrographic examination of metals, 34*A*.
Methley, B. W., limits of accuracy in sulphur determinations, 468*P*.
Meyer, E. R., induction hardening, 174*A*.
Middel, W., recovery of iodine and potassium chloride from flue dust, 199*A*.
Mika, T. F., drawability of thin metals, 58*A*.
Miley, H. A., oxidation and tarnishing of metals, 128*A*., 224*A*.
Miller, E. K., dry-air blast, 166*A*.
Miller, V., sintering of manganese ore, 88*A*.
Mills, D. M., specifications for steel, 123*A*.
Milnes, A. H., drop-forging aircraft parts, 58*A*.
Minkoff, I., elected Associate, 4*P*.
Miser, H. D., manganese in Arkansas, 87*A*.
Mitchell, J. :
Paper : "Comparative Study of Three Ingots Received from Soc. Anon. des Hauts Fourneaux, Forges et Aciéries de Denain et d'Anzin, at Denain, France," 295*P*. *Joint Discussion*, 363*P*. *Joint Correspondence*, 377*P*. *Author's Reply*, 386*P*.
Paper : "Rimming Steel. Report on Four Ingots of Basic Bessemer Steel," 327*P*. *Joint Discussion*, 363*P*. *Joint Correspondence*, 377*P*. *Author's Reply*, 386*P*.
Mitchell, R. W., cleaning of metals, 175*A*.
Mohler, F., electric driving of rolling mills, 14*A*.
Möller, H. :
determination of elastic constants, 35*A*.
microstructure of iron ore, 76*A*.
stress measurement by X-rays, 68*A*

MONTGOMERY, T. B., temper mills, 141*A*.
MOONEY, R. H., clay slurry additions to moulding sand, 136*A*.
MOORE, C. J., elected Member, 3*P*.
MORRIS, D. O., machinability of metals, 27*A*.
MORRIS, J. S., training of open-hearth operators, 204*A*.
MORROGH, H. :
defects in cast iron, 75*A*.
detection of alloy elements in cast iron, 75*A*.
metallography, 74*A*.
MORSE, L. G. E., elected Member, 3*P*.
MORTON, B. B., corrosion of metals in refinery plant, 189*A*.
MOSS, F. C., obituary notice, 500*P*.
MOTT, R. A., caking and swelling of coal, 164*A*.
MOULDING MATERIALS SUB-COMMITTEE, Second Report, 393*P*.
MUELLER, J., forging practice, 105*A*.
MUIR, W. P., forging shells, 12*A*.
MÜLLER, F., corrosion tests by potential measurements, 224*A*.
MUMFORD, A. R., use of blast-furnace gas under boilers, 197*A*.
MUNROE, J. M., handling of castings, 202*A*.
MURFITT, G., determination of sulphur in steel, 471*P*.
MURRAH, E. S., strip reeling, 59*A*.
MURRAY, S., electrodeposition of metals, 113*A*.

NAESER, G. :
basic Bessemer process, 103*A*., 204*A*.
recovery of vanadium from iron, 45*A*.
NAGLER, C., effect of elements on austenite transformation in cast iron, 186*A*.
NEERFELD, H. :
determination of elastic constants, 35*A*.
transformation curves in cases of restricted diffusion, 77*A*.
NEILSON, J. H. S., elected Associate, 4*P*.
NEUMAN, D., mathematics for wire mills, 13*A*.
NEUMANN, G., entropy, 4*A*.
NEWBRANDER, S. M., use of blown metal in basic open-hearth practice, 206*A*.
NEWELL, W. C. :
hair-line crack formation, 254*P*.
determination of sulphur and phosphorus in steel, 473*P*.
remarks on paper by Hume-Rothery and others, 483*P*.
rimming steel, 371*P*.
NICHOLAS, I. A., bottoms for basic open-hearth furnaces, 205*A*.
NIEZOLDI, O., ancient cast iron, 95*A*.
NORBURY, A. L., remarks on Goldschmidt's paper, 177*P*.
NORBURY, C., moulding of crusher shell, 101*A*.
NORRIS, G. L., obituary notice, 501*P*.

OATES, J. A., elected Member, 3*P*.
O'CONNELL, W. J., JUN., microbiological deposits in water, 189*A*.
ODE, W. H., agglutinating value of coal, 93*A*.
OFFENHAUER, C. M., carbides in low-chromium steel, 222*A*.
OLDACH, S., corrosion of binary alloys, 125*A*.
OLDERSHAW, F., effect of sulphur and manganese in cast iron, 151*A*.
OLIVER, D. A., hair-line crack formation, 245*P*.
ONDERDONK, P. T., stress relieving of welds, 64*A*.
O'NEILL, H. :
Paper : "The Production in Rotary Furnaces of Steel for Castings." *See* LEMON, F. A.
defects in rails and tyres, 69*A*.
rimming steel, 382*P*.
OPITZ, H., wear of cast iron, 219*A*.
OSHRY, H. I., photometric instruments, 152*A*.
OSSWALD, E., determination of elastic constants, 35*A*.
OVERATH, W., phosphatising, 180*A*.

PACKHAM, P. C., elected Associate, 4*P*.
PAGE, T. H. D., electrolytic corrosion of buried metals, 126*A*.
PALMER, T. J., bronze-welding of cast iron, 175*A*.
PAQUET, J., sintering of Minette ore and flue dust, 195*A*.
PARKE, R. M., hardenability of steel, 69*A*.
PARKER, C. M., national emergency steels, 216*A*.
PARKER, T. W. and J. F. RYDER :
Paper : "Investigations on 'Falling' Blast-Furnace Slags," 21*P*.

PARKES, W. B., elected Member, 3*P*.
PARKIN, G. :
determination of sulphur in steel, 476*P*.
hair-line crack formation, 267*P*.
titanium carbides and nitrides, 485*P*.
PARKS, B. C., determination of fusain in coal, 158*A*.
PARRY, V. F., drying of lignite, 197*A*.
PATEK, P. :
design of forging dies, 172*A*.
forging dies, 140*A*.
PATEMAN, L. W., elected Associate, 4*P*.
PATERSON, D. G. P., training of metallurgists, 124*A*., 221*A*.
PATTERMANN, O., hardening cracks in high-speed steel, 108*A*.
PAVLIS, F., effect of acetic acid on metals, 226*A*.
PEARSON, J. M., measurement of corrosion, 127*A*.
PECK, C. E., controlled atmospheres, 173*A*.
PEILE, J. B., elected Member, 3*P*.
PEMBERTON, H. N., tests of welds, 146*A*.
PEOPLES, J. W., chromite in Montana, 1*A*.
PETER, W., precipitation hardening and creep strength of columbium steel, 72*A*.
PETERMANN, F. B., sintering of manganese ore, 88*A*.
PETERSEN, C., effect of stresses on structure of metals, 147*A*.
PETERSON, R. G., sintering of manganese ore, 88*A*.
PETERSON, W., stress relieving of welds, 64*A*.
PETZOLD, F., analysis of vanadium-bearing slag, 83*A*.
PFANNENSCHMIDT, C. W., cast iron cylinder liners, 122*A*.
PHILBROOK, W. O. :
use of Leco apparatus in analysis, 205*A*.
use of photelometer in analysis, 205*A*.
PIGOTT, E. C., analysis of ferrous metals, 80*A*.
PIKE, J. A., sintering of manganese ore, 88*A*.
PILLING, N. B., structure of nickel steel and nickel cast iron, 223*A*.
PINDER, H. W. :
hair-line crack formation, 259*P*.
high-speed steel, 207*A*.
elected Member, 3*P*.
PITROVSKIY, G., blowing-out of blast-furnaces, 45*A*.
POLA, W., cupola practice, 96*A*.
POMP, A., effect of cold-rolling and annealing on Watt losses of dynamo and transformer steel, 120*A*.
POWELL, R. W., thermal conductivity of materials, 90*A*.
POWIS, G., mechanical stokers for metallurgical furnaces, 43*A*.
PRAY, H., accelerated atmospheric corrosion test, 39*A*.
PUMPHREY, W. I., elected Associate, 4*P*.
PUSCH, R., corrosion cracking of steel, 37*A*.
PYATT, W. F., elected Member, 3*P*.

QUARRELL, A. G. :
Paper : "The Determination of the Solubility of Hydrogen in Iron and Iron Alloys." *See* ANDREW, J. H.
Paper : "The Formation of Hair-Line Cracks." *See* ANDREW, J. H.
rimming steel, 368*P*.

RALSTON, R. R., magnesia-silica system, 196*A*.
RAMBERG, W., properties of stainless steel sheets, 146*A*.
RAMMLER, E., gasification in small producers, 196*A*.
RAMP, P. R., casting of hollow rolls, 10*A*.
RAMSEY, E. L., sulphite-treated steels, 170*A*.
RAYMOND, L. E., hardening of steel in salt baths, 212*A*.
READ, E. B., slagging of refractories, 162*A*.
READER, L. J., leaching of manganese carbonate ores, 41*A*.
REAGAN, W. J. :
contamination of steel by alloy elements, 169*A*.
steel-making practice, 50*A*.
REES, O. W. :
determination of ash in coal, 158*A*.
determination of fusain in coal, 158*A*.
REESE, D. J. :
cupola practice, 47*A*., 96*A*., 167*A*.
increase of production in foundries, 99*A*.

REICHERT, J. W., Japanese iron industry, 46*A*.
REICHSFELD, W. M., elected Member, 3*P*.
REIMER, G., cold rolling, 141*A*.
REIN, A., hot-blast mains and valves, 198*A*.
REINARTZ, P. M., American steel expansion programme, 206*A*.
REITMEISTER, W., moulding sands, 9*A*.
RENWICK, W., steel moulds for plastics, 172*A*.
REPLOGLE, H. E., air-hardening steels for forging dies, 172*A*.
RESOW, H., production capacity of steel foundries, 202*A*.
REULECKE, W., failure of welded bridges, 21*A*.
REYNOLDS, D. A., properties of coke, 198*A*.
RICHARD, K., embrittlement of alloy steel at high temperatures, 29*A*.
RICHARDSON, K., elected Associate, 4*P*.
RICKER, R., planning production in ironworks, 105*A*.
RIDSDALE, N. D., moulding sands, 455*P*.
RIEDRICH, G.:
effect of nitrogen in chromium-nickel steel, 121*A*.
embrittlement of chromium steel at high temperatures, 29*A*.
heat-resistant steel, 123*A*.
RIENDEAU, J. D., elected Associate, 4*P*.
RIGBY, G. R., carbon blocks for blast-furnaces, 162*A*.
RITTER, E., recovery of vanadium from iron, 45*A*.
ROBERTSON, F. W., levelling machine for sheets, 59*A*.
ROBIETTE, A. G., heat treatment, 106*A*.
ROBINSON, A., rimming steel, 365*P*.
ROCKEFELLER, H. E., cutting of billets, 66*A*.
ROCKEFELLER, J. W., JUN., aircraft instrument springs, 150*A*.
ROCKWELL, M. M., stretch forming of sheets, 140*A*.
ROESNER, G., phosphatising, 178*A*.
ROGERS, B., elected Member, 3*P*.
ROGNER, H., cleaning of metals, 176*A*.
ROHRMAN, F. A., effect of acetic acid on metals, 226*A*.
ROLL, F.:
corrosion of cast iron, 225*A*.
ROLL, F. (*contd.*)—
corrosion of salt bath containers, 227*A*.
effect of aluminium coatings on cast iron, 182*A*.
effect of molten zinc on malleable cast iron, 181*A*.
ROONEY, T. E., limits of accuracy in sulphur determinations, 469*P*.
ROSENSTIEHL, F. E., lubricating oils, 210*A*.
ROSS, D., obituary notice, 501*P*.
ROTERS, H., potential changes of iron-zinc couples, 38*A*.
ROTHERHAM, L., damping capacity of engineering materials, 70*A*.
ROTTER, A., open-hearth process at Witkowitz, 103*A*.
RÜBMANN, H., planing of blooms, 23*A*.
RUDORFF, D. W.:
effect of molybdenum and titanium in chromium-vanadium steel, 31*A*.
effect of vanadium and molybdenum on creep strength of steel, 150*A*.
hardening cracks in high-speed steel, 108*A*.
hydrogen in steel and cast iron, 72*A*.
solidification of castings, 203*A*.
RUECKEL, W. C., heating of coke ovens, 92*A*.
RUSSELL, G. A. V., steel manufacture, 51*A*.
RUSSELL, T. F., hair-line crack formation, 251*P*., 265*P*.
RUTENBECK, T., cavitation corrosion of metals, 155*A*.
RYDER, F.:
costs in open-hearth practice, 51*A*.
fuel costs for reheating furnaces, 43*A*., 91*A*.
RYDER, J. F.:
Paper : "Investigations on 'Falling' Blast-Furnace Slags." *See* PARKER, T. W.

SACCHI, V. P., protective value of phosphate and oxide coatings, 192*A*.
SACHS, G., properties of forgings, 118*A*.
SAEGER, C. M., JUN., elastic properties of alloy cast iron, 31*A*.
SAGE, A. M., elected Associate, 4*P*.
ST. CLAIR, L. J., performance of cutting tools, 22*A*.

SAMPLE, J. A., spectrographic analysis in steelworks, 205*A*.
SAMUELS, M. L., effect of hydrogen in malleablising process, 167*A*.
SAND, H. J. S., polarographic analysis, 228*A*.
SANDBERG, G. H., welding of stainless steel pressure vessels, 175*A*.
SANDERS, L. W., production of steel castings, 135*A*.
SANDERS, T. H., obituary notice, 501*P*.
SANDHOFF, A. G., coking pressures, 164*A*.
SANDS, G. A., properties of stainless steel, 151*A*.
SANDSTEDE, K., determination of sulphur dioxide in flue gases, 83*A*.
SARETZKY, E. M., pickling of steel, 176*A*.
SARJANT, R. J., hair-line crack formation, 246*P*.
SCHACK, C. H.:
beneficiation of manganese ore, 194*A*.
concentration of manganese ore, 41*A*.
SCHAEFER, V. J., surface replicas for use with electron microscope, 221*A*.
SCHÄFER, R., hardening of steel, 214*A*.
SCHAFMEISTER, P., electrolytic polishing of metals, 34*A*.
SCHERER, R., effect of nitrogen in chromium-nickel steel, 121*A*.
SCHIKORR, G., atmospheric corrosion of iron, 187*A*.
SCHLAIN, D., electrodeposition of manganese, 194*A*.
SCHLESINGER, G., machinability of steel, 111*A*.
SCHLIESSMANN, O., spectrum analysis, 81*A*.
SCHLÖTTER, M., corrosion of electrolytic zinc coatings, 190*A*.
SCHMAHL, N. G.:
behaviour of iron oxides with other oxides, 198*A*.
relation between oxygen pressure, temperature, and composition in Fe_2O_3–Fe_3O_4 system, 166*A*.
SCHMELLENMEIER, H., corrosion of eletrolytic zinc coatings, 190*A*.
SCHMITZ, H., effect of temperature on creep strength, 27*A*.
SCHNEIDER, C. E., obituary notice, 491*P*.
SCHOFIELD, F. H., elected Member, 3*P*.
SCHOFIELD, T. H., elected Member, 3*P*.
SCHÖNWÄLDER, F. H., reversing valves for open-hearth furnaces, 11*A*.
SCHRADER, H.:
elimination of dust and noise in foundries, 137*A*.
tensile properties of steel annealed in hydrogen, 30*A*.
SCHRENK, H. H.:
measurement of atmospheric pollution, 164*A*.
photometric instruments, 152*A*.
SCHRODER, C. R., spot welding of high-tensile steel, 144*A*., 215*A*.
SCHROEDER, W. C., intercrystalline cracking of boiler steel, 156*A*.
SCHRUPP, C., Greenawalt sintering plant, 2*A*.
SCHUBERT, H.:
Paper: "The First Cast-Iron Cannon Made in England," 131*P*.
SCHULTE, F., heat-resistant steel, 123*A*.
SCHULTZE, F., effect of tension during cold-rolling of strip, 15*A*.
SCHUSTER, L., phosphatising, 178*A*., 180*A*.
SCHWARZ, M. VON, cavitation of metals, 155*A*.
SCHWARZ, W.:
determination of silicon, 82*A*.
spectrum analysis of inclusions, 81*A*.
SCHWIEDESSEN, H.:
pin distribution on converter bottoms, 50*A*., 203*A*.
thermal efficiency of furnaces, 4*A*.
SCOTT, F. W.:
desulphurisation of iron in open-hearth process, 170*A*.
effect of manganese on desulphurising power of calcium silicates, 138*A*.
rotating induction furnace, 104*A*.
SEFING, F. G., production of castings, 201*A*.
SEIL, G. E., chrome ores, 42*A*.
SELVIG, W. A.:
agglutinating value of coal, 93*A*.
determination of ash in coal, 158*A*.
SHARPE, D., elected Member, 3*P*.
SHELTON, S. M.:
concentration of flue dust, 166*A*.
concentration of manganese-bearing ore, 131*A*., 194*A*.
concentration of manganese nodules, 88*A*.

SHELTON, S. M. (*contd.*)—
concentration of manganese ore, 88*A*.
concentration of manganiferous iron ore, 88*A*.
concentration of wad ore, 195*A*.
grinding of carnotite ore, 194*A*.
ore dressing, 88*A*.
SHERMAN, W. F., low-alloy steel for aircraft construction, 221*A*.
SHORT, M. N., microscopic determination of ore minerals, 34*A*.
SHUBINA, N., flame hardening of rails, 62*A*.
SHULER, G., cementing high-speed steel tips to carbon steel shanks, 111*A*.
SHUTE, D. H., elected Associate, 5*P*.
SIDDLE, W., elected Member, 3*P*.
SIEBEL, E., theory of rolling, 14*A*.
SILVERMAN, L., determination of copper and nickel in steel, 158*A*.
SILVERTHORN, R. W., colorimetric analysis, 82*A*.
SIMS, C. E. :
addition of aluminium to killed steel, 205*A*.
defects in enamel coatings, 116*A*.
SKEATES, F. B., side-blown converters, 99*A*.
SKERL, J. G. A., core sand, 460*P*.
SLATER, L. E., moulding of cast iron cylinder cover, 168*A*.
SMALLEY, O., brake drums, 134*A*.
SMITH, A. E. MCRAE, high-duty cast iron, 48*A*.
SMITH, D. W., elected Member, 3*P*.
SMITH, E. W. P., arc welding of stainless steel, 66*A*.
SMITH, G. V., JUN., decomposition of austenite, 223*A*.
SMITH, R. C., JUN., density and porosity of carbonaceous materials, 93*A*.
SMITH, R. E., moisture control and preheating of cupola blast, 97*A*.
SMITH, R. P., obituary notice, 502*P*.
SMITH, S., flame hardening, 213*A*.
SMITH, T. B. :
accuracy in analysis, 474*P*.
by-product recovery, 5*A*.
SONNTAG, J., phosphate coatings, 179*A*.
SPEAKMAN, C. H., atomic hydrogen welding of tool steel, 145*A*.
SPENCER, G. T., elected Member, 3*P*.
SPRAGEN, W. :
corrosion-resistance of welds, 215*A*.
fusibility tests for determining weldability, 66*A*.
tests of welds, 145*A*.
SPRAY, S., elected Member, 3*P*.
SQUIRE, C. E., obituary notice, 503*P*.
STACKELBERG, M. VON, determination of alloy additions in steel, 83*A*.
STAMP, E., elected Associate, 5*P*.
STANDARD METHODS OF ANALYSIS SUB-COMMITTEE :
First Report. Further Discussion, 467*P*. *Sub-Committee's Reply*, 479*P*.
STANFIELD, G. :
damping capacity of engineering materials, 70*A*.
obituary notice, 503*P*.
STANLEY, J. K., recrystallisation of silicon ferrite, 223*A*.
STAPPENBECK, R., mineral deposits in South America, 87*A*.
STECK, R., planning production in ironworks, 105*A*.
STEEL CASTINGS RESEARCH COMMITTEE :
Second Report of the Moulding Materials Sub-Committee, 393*P*. *Discussion*, 455*P*. *Correspondence*, 461*P*. *Sub-Committee's Reply*, 463*P*.
STEFFES, M., sintering of Minette ore and flue dust, 195*A*.
STEINER, J., laboratory arc furnaces, 151*A*.
STEINMETZ, M. H., determination of elements in alloys, 82*A*.
STEPHENS, H. A., tests of moulding sand, 100*A*.
STEVEN, W., elected Associate, 5*P*.
STEVENSON, W. W. :
Paper : "A Note on Diffusion in Rimming Steel on Soaking at About 1300° C." *See* SWINDEN, T.
STEWART, I. :
case-hardening of gears, 62*A*.
dry-cyaniding, 63*A*.
gas carburising, 107*A*., 143*A*.
gear-tooth failures, 147*A*.
nitriding of high speed steel, 63*A*.
steels for case-hardening, 16*A*.
STEWART, R. C., salt baths for case-hardening, 143*A*.
STIELER, C., cupola practice, 47*A*.
STOLTZ, G. E., speed control of rolling-mill motors, 210*A*.
STONE, M. D., electro-tinning, 24*A*.

STONES, J. M., moulding of crusher shell, 101*A*.
STRAUSS, J., chrome ore requirements of United States, 41*A*.
SULLIVAN, J. D., refractory materials, 3*A*.
SURAU, F., gating of castings, 49*A*.
SWAIN, S. M., fireclay brick, 3*A*.
SWINDEN, R., elected Associate, 5*P*.
SWINDEN, T. :
Paper : "Rimming Steel. Additional Studies of the Composition Variation from Outside to Centre," 345*P*. *Joint Discussion*, 363*P*. *Joint Correspondence*, 377*P*. *Author's Reply*, 388*P*.
hair-line crack formation, 259*P*.
rimming steel, 376*P*., 380*P*.
SWINDEN, T., and W. W. STEVENSON :
Paper : "A Note on Diffusion in Rimming Steel on Soaking at About 1300° C.," 357*P*. *Joint Discussion*, 363*P*. *Joint Correspondence*, 377*P*. *Authors' Reply*, 388*P*.
SZUBINSKI, W., weldability of high-tensile steel, 20*A*.

TAFFS, H. J., photographs of metals, 34*A*.
TAMARIN, M. D., temperature distribution in coke-oven walls, 92*A*.
TARASOV, L. P., classification of scrap by spark testing, 120*A*.
TARASOV, P. P., nails from ruins of St. Pierre, 154*A*.
TAYLOR, D. :
defects in steel, 119*A*.
tool steels, 212*A*.
elected Member, 3*P*.
TAYLOR, J. R., strip mill of Carnegie-Illinois Steel Corp., 15*A*.
TAYLOR, N. W., refractory materials, 162*A*.
TAYLOR, W. J., hardness tests for estimating tensile strength, 218*A*.
TEDDS, D. F. B., elected Associate, 5*P*.
TEMPLETON, R. B., cast iron crankshafts, 134*A*.
THACKWELL, F. E., beneficiation of manganese ore, 194*A*.
THANHEISER, G. :
analysis by drop reactions, 157*A*.
polarographic determination of vanadium and chromium, 83*A*.
spectrum analysis, 81*A*.
THAYER, T. P., chromite in Oregon, 1*A*.
THOMAS, B. :
"dead" steel, 147*A*.
heat treatment of die blocks, 65*A*.
heat treatment and work-effect on steel, 106*A*.
nitrided cast iron, 173*A*.
tool steel, 27*A*.
THOMAS, L. A., elected Associate, 5*P*.
THOMSON, J., defects in steel, 208*A*.
THÖNNESSEN, F., cleaning of blast-furnace gas, 6*A*.
THORNHILL, R. S. :
Paper : "A Study of Some Soluble Inhibitors, with Special Reference to Heat Transfer with Water-Line Attack," 73*P*. *Part I.*—Explanatory Statement and Résumé of Conclusions. By U. R. EVANS, 74*P*. *Part II.*—Description of the Research. By R. S. THORNHILL, 83*P*. *Correspondence*, 103*P*. *Authors' Reply*, 104*P*.
THORNTON, B. M., determination of dew point of gases, 132*A*.
THRING, M. W., use of low-grade fuel in producers, 165*A*.
THUM, A. :
effect of stresses on structure of metals, 147*A*.
embrittlement of alloy steel at high temperatures, 29*A*.
TICE, E. A., flame-cleaning of structural steel, 23*A*.
TIMBRELL, J., moulding of gear wheels, 168*A*.
TIMMERMANN, D. :
changing of rolls, 15*A*.
strip mills, 14*A*., 141*A*., 211*A*.
TINDULA, R. W., iron ore for basic open-hearth process, 204*A*.
TINKER, G. P., arc furnaces, 104*A*.
TINSLEY, D., elected Associate, 5*P*.
TIPPER, A., corebinders, 202*A*.
TISDALE, N. F., effect of boron in steel and cast iron, 121*A*.
TITUS, A. C., analysis of steel, 157*A*.
TIVERTON, THE RT. HON. THE VISCOUNT, elected Member, 3*P*.
TOBIAS, P. :
core binders, 10*A*.
short cycle annealing of malleable cast iron, 98*A*.
TOFAUTE, W., embrittlement of chromium steel, 71*A*.
TOMKINS, S. S., determination of sulphur in coal and coke, 83*A*.

TOOTLE, C. R., elected Associate, 5*P*.
TOWN, H. C., presses for sheet metals, 58*A*.
TOY, F. L., plasticity of chrome ore, 205*A*.
TOY, T. L., use of photelometer in analysis, 205*A*.
TRAVERS, H. A., electric driving of rolling mills, 210*A*.
TROST, A., X-ray examination, 152*A*.
TUCKER, R. C., moulding sands, 457*P*.
TUCKER, W. M., heavy nickel plating, 24*A*.
TUCKERMAN, L. B., properties of stainless steel sheets, 146*A*.
TURNER, H. R., steel cartridge cases, 58*A*.

UHLING, H. H., effect of hydrochloric acid on stainless steel, 127*A*.
UHLITZSCH, H., Maurer's diagram for cast iron, 67*A*.
ULLMAN, F. E., recovery and preparation of scrap, 169*A*.
UNGER, A. M., impact strength of spot welds, 65*A*.
UNGERSBÖCK, O.:
  effect of electric current on acid attack on iron, 226*A*.
  pickling of steel in presence of inhibitors, 23*A*.
UTTON, D., elected Member, 4*P*.

VAN DER HOEVEN, B. J. C., effect of coking rate on by-products, 197*A*.
VASHENKO, K. I., iron-silicon-carbon alloys, 133*A*.
VASILEV, V. E., iron-silicon-carbon alloys, 133*A*.
VATCHAGANDHY, J. S., weldability of alloy steel, 109*A*.
VAUGHAN, E. J.:
  determination of sulphur in steel, 478*P*.
  use of Spekker absorptiometer in analysis, 227*A*.
VAUGHN, F. F., induction hardening, 174*A*.
VDOVENKOV, M., blowing out of blast-furnaces, 45*A*.
VINCENT, J. D., concentration of manganese ore, 41*A*.
VIPOND, J. S., sulphur prints, 75*A*.
VOGEL, R., iron/iron-sulphide/calcium-sulphide system, 36*A*.
VOGT, F. W., bearings for rolling mills, 210*A*.
VOLK, K. E.:
  electrolytic polishing of metals, 34*A*.
  scaling resistance of alloy steel, 63*A*.
VOLTERRA, R., iron powders, 95*A*.
VRATSKIY, M., recrystallisation of boiler plate, 68*A*.

WADDINGTON, E. S., suitability of mild steel for arc welding, 110*A*.
WAGNER, E., clay substance in moulding sand, 100*A*.
WAITE, G. C., elected Member, 4*P*.
WAKELIN, J. H., JUN., magnetisation near boundaries, 120*A*.
WALKER, A. W., elected Associate, 5*P*.
WALKER, G. W., deep etching, 75*A*.
WALKER, S., tests of moulding sand, 136*A*.
WALKER, T. R., elected Member, 4*P*.
WALL, T. F.:
  arc furnaces, 207*A*.
  high frequency furnaces, 12*A*.
WALLACE, E. M., effect of hydrochloric acid on steel, 127*A*.
WALLFRED, C. L., leaching of manganese-carbonate ores, 41*A*.
WALTER, D., determination of copper and nickel in steel, 158*A*.
WALTER, K., equilibrium between iron, iron oxide, hydrogen and water, 225*A*.
WALZEL, R., definition of terms "Bruch" and "Riss," 119*A*.
WASHBURN, T. S., hot metal charges for basic open-hearth furnaces, 205*A*.
WATERKAMP, MARIA, analysis by drop reactions, 157*A*.
WEAN, R. J., strip mills, 142*A*.
WEBSTER, R., cleaning of castings, 10*A*.
WEIHRICH, R.:
  determination of silicon, 82*A*.
  non-magnetic wrapping wire, 33*A*.
  spectrum analysis of inclusions, 81*A*.
WEIKEL, R. A., instrument department in steelworks, 137*A*.
WERNER, O., bend tests of weld metal, 20*A*.
WESLEY, W., coatings for condenser tubes, 179*A*.
WESLY, W., corrosion of boilers due to feedwater, 189*A*.
WEST, J. H., strickle moulding, 101*A*.
WEST, J. L.:
  determination of phosphorus in steel, 472*P*.

WEST, J. L. (*contd.*)—
limits of accuracy in sulphur determinations, 469*P*.
elected Member, 4*P*.
WEST, W., elected Member, 4*P*.
WEVER, F., precipitation hardening and creep strength of columbium steel, 72*A*.
WHITCHER, J., corrosion of cast iron in soil, 127*P*.
WHITCOMB, A. J., charging of blast-furnaces, 198*A*.
WHITE, A. B., electric welding machines, 214*A*.
WHITELEY, J. H., rimming steel, 371*P*.
WHITLOCK, T. M., elected Member, 4*P*.
WHITTEMORE, H. L., properties of stainless-steel sheets, 146*A*.
WIEDERHOLT, W., phosphate coatings, 179*A*.
WIESTER, H. J., weldability of high-tensile steel, 20*A*.
WILCOCK, R., elected Member, 4*P*.
WILLARD, H. H., determination of phosphorus in iron ore, 158*A*.
WILLEMS, J., polarographic determination of vanadium and chromium, 83*A*.
WILLIAMS, A. E., elected Associate, 5*P*.
WILLIAMS, C. G., fatigue of crankshafts, 184*A*.
WILLIAMS, C. H., patching of rotary furnace linings, 71*P*.
WILLIAMS, L. H., elected Associate, 5*P*.
WILLIAMS, M. L.:
weldability tests, 67*A*.
weldability tests of steel, 19*A*.
WILLIAMS, R. E. H., linings for tilting furnaces, 18*P*.
WILLIAMS, S. R., elected Associate, 5*P*.
WILLIAMS, S. V., bright annealing of steel, 64*A*.
WILLIAMS, T. H., detection of nickel in alloy steel, 82*A*.
WILLIAMS, W. D., magnetostriction phenomena, 70*A*.
WILLIS, K., elected Associate, 5*P*.
WILMS, O. H., effect of elements on the temper brittleness and hot brittleness of structural steel, 32*A*.
WILSON, J. F., slag-line attack on tilting furnace linings, 16*P*.
WILSON, W., elected Member, 4*P*.
WINLACK, G. D., deseaming of billets, 175*A*.
WINLOCK, J., Shotweld process of welding stainless steel, 110*A*.
WOLDMAN, N. E., cadmium plating, 113*A*.
WOLFE, G. F., bridges for handling iron ore, 2*A*.
WOLFF, L., scarfing of billets, 22*A*.
WOOD, C. E., leaching of manganese-carbonate ores, 41*A*.
WOOD, F. C., dry-air blast, 7*A*.
WOOD, W. P., effect of elements on austenite transformation in gamma iron, 186*A*.
WOOLAS, P., elected Member, 4*P*.
WOOLMAN, J.:
hair-line crack formation, 253*P*.
titanium carbides and nitrides, 484*P*.
WRIGHT, J. H., elected Member, 4*P*.
WÜBBENHORST, H., effect of cold-rolling and annealing on Watt losses of dynamo and transformer steels, 120*A*.
WULFF, J., iron powders, 95*A*.
WYMAN, W. F., leaching of manganese carbonate ores, 41*A*.
WYZALEK, J. F., Nicarb process of case-hardening, 63*A*.

YARNE, J. L., defects in enamel coatings, 116*A*.
YAROTSKY, M. F., co-operation between open-hearth and rolling-mill departments, 206*A*.
YEADON, R., hydraulic plant in steelworks, 57*A*.
YOCH, A. H., oxy-acetylene cutting machine, 21*A*.
YORK, F. H., elected Member, 4*P*.
YOUNG, C. B. F., electrolytic polishing, 186*A*.

ZADRA, J. B.:
concentration of manganese-bearing ore, 131*A*.
concentration of manganiferous iron ore, 88*A*.
ZAPFFE, C. A., defects in enamel coatings, 115*A*., 116*A*.
ZENER, C., lattice expansion due to cold work, 25*A*.
ZERFOSS, S., refractory materials, 162*A*.
ZIMMERLEY, S. R.:
beneficiation of manganese ore, 194*A*.
concentration of manganese ore, 41*A*.